Top 10 papers in Travel Medicine

Dr. Maya Hites
Clinic of Infectious Diseases
CUB-Erasme Hospital
0ctober 10, 2019

No conflicts of interest

But….

- No rules to follow
- Personal interpretation
- I am a clinician…. maybe diagnostic tests were less favored.
- I am an infectious disease specialist

Methods

- Articles published in October 2018 or later, only in English

- Search Pubmed with key words:
  - Traveler's diahrea and 2019
  - Malaria and travel and 2019
  - Dengue and travel and 2019
  - Chikungunya and travel and 2019
  - Zika and travel and 2019
  - Measles and travel and 2019
  - Japanese encephalitis and travel and 2019
  - Arboviruses and travel and 2019 (14)
  - MERS and travel and 2019
  - Typhoïd Fever and travel and 2019
  - Schistosomiasis and travel and 2019
  - Leishmaniasis and travel and 2019
  - Chagas disease and travel and 2019

- Systematic review of the table of contents of
  - Lancet Infectious Diseases
  - Clinical Infectious Diseases
  - Int J Infect Dis
  - Journal of Travel Medicine (30)
  - Travel Medicine and infectious Diseases (55)
  - Clin Microbiol Infect

Methods

- Types of articles chosen:
  - Included:
    - Original papers (studies: in-vitro, in-vivo or clinical)
    - meta-analysis or systematic review
    - case reports
  - Excluded: editorials or reviews

- Articles were prioritized based on:
  - Quality of the paper
  - Attempts to answer questions of current clinical interest
  - further questions generated from the research

Results: +/- 100 articles reviewed
- 10 articles chosen
- Not presented in a hierarchical order!

Contents lists available at ScienceDirect

International Journal of Infectious Diseases

journal homepage: www.elsevier.com/locate/ijid

Short Communication

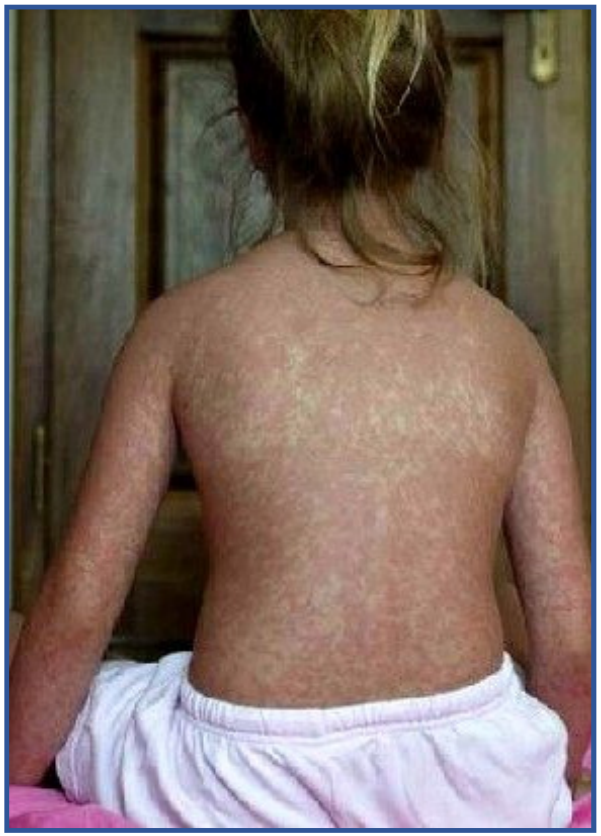
Measles transmission at an international airport — Taiwan, March–April 2018

1

Hsin-I Huang[a], Ming-Chu Tai[b], Kun-Bin Wu[b], Wan-Chin Chen[a], Angela Song-En Huang[a], Wen-Yueh Cheng[c], Ming-Tsan Liu[c], Wan-Ting Huang[a,*]

A 32 year old male with unknown measles vaccination history:

- Travel from Taiwan --> Bangkok (where measles was widespread)--> Taiwan (March 1-->4, 2018)
- Returned to work on March 4th
- Fever and cough on March 14th
- March 17: flight Taiwan --> Okinawa, Japan
- March 19: rash --> hospital: Measles confirmed by RT-PCR testing



International Journal of Infectious Diseases 86 (2019) 188–190

Contact tracing/Outbreak investigation

- Screening of:
  - Household contacts
  - Work colleagues
  - Cabin crew
  - Passengers within 2 rows in the plane
  - People who attended the Taiwan Clinic at the same time
- Announcements/ publicity on TV

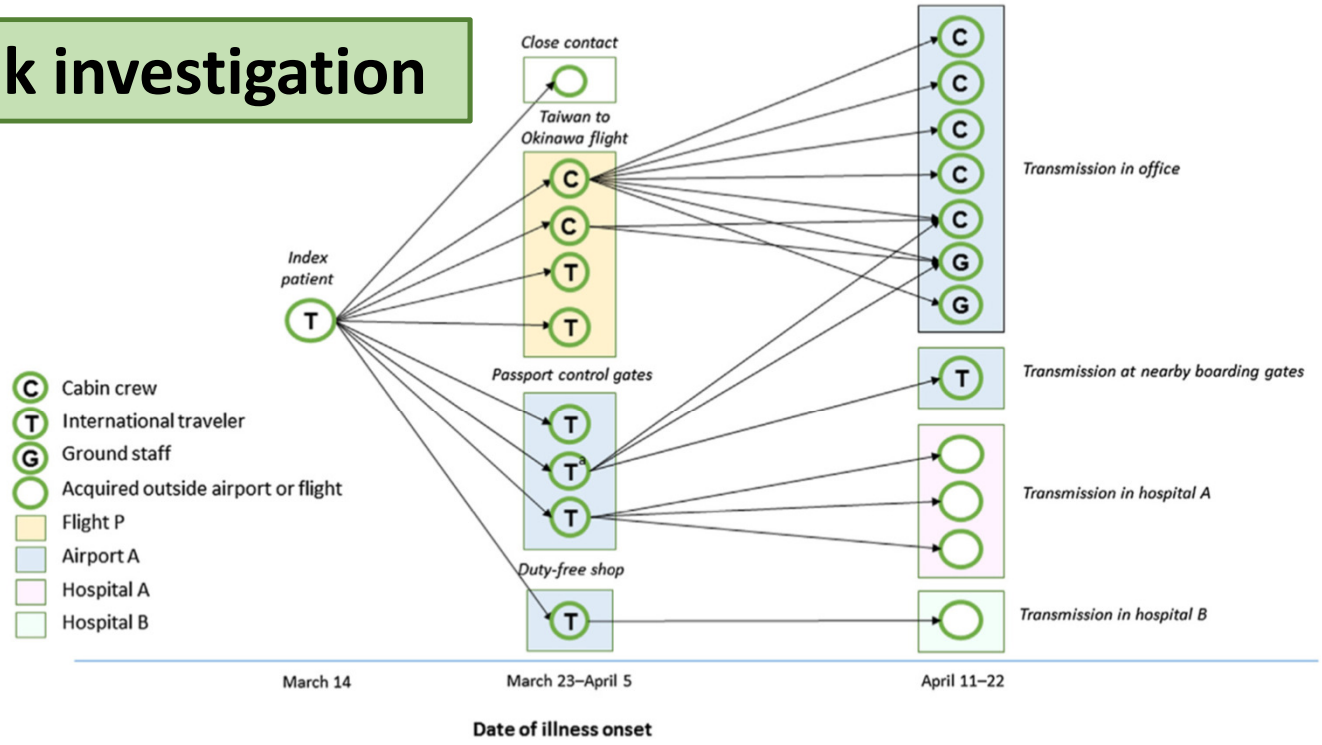


Figure 1. Transmission of measles from an international traveler — Taiwan, March–April 2018.
[a]The case was an airline cabin crew member who was traveling off duty at the time.

- Measles is highly contagious!
- Should be a DD in returning travelers (+non-travelers)!
- Importance of verifying measles vaccination coverage in patients going to pre-travel clinic!!

Travel Medicine and Infectious Disease 27 (2019) 107–114

Contents lists available at ScienceDirect

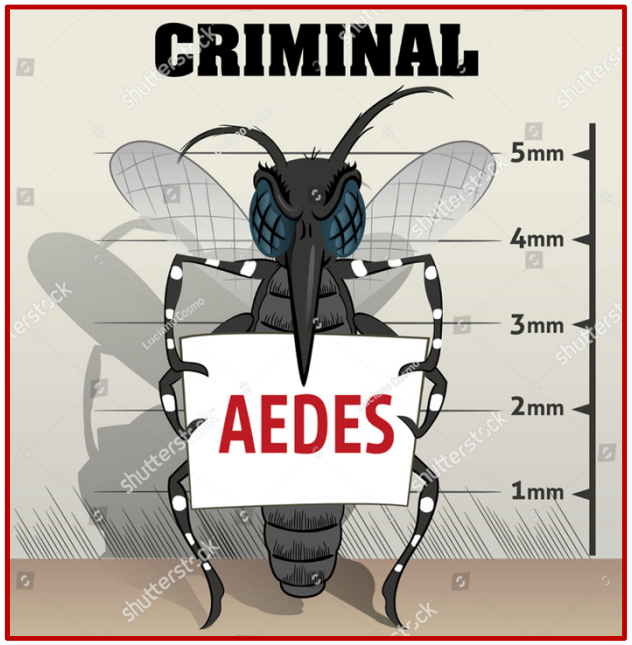
Travel Medicine and Infectious Disease

journal homepage: www.elsevier.com/locate/tmaid

A cross-sectional analysis of Zika virus infection in symptomatic and asymptomatic non-pregnant travellers: Experience of a European reference center during the outbreak in the Americas

Ralph Huits[a,*], Ula Maniewski[a], Dorien Van Den Bossche[a], Erica Lotgering[a], Achilleas Tsoumanis[a], Lieselotte Cnops[a], Jan Jacobs[a,b], Marjan Van Esbroeck[a], Emmanuel Bottieau[a]

2



Background:

- Travelers to areas with vector-borne Zika transmission are at risk of infection
- Clinical manifestation: mild dengue-like illness
- Exposed travelers perceive ZIKV infection as a serious hazard (ZIKV congenital syndrome, secondary sexual transmission) --> increasing demand for ZIKV diagnostics even if asymptomatic, because +/- 80% of cases in endemic situations were reported to be asymptomatic
- Counseling about risk of sexual transmission + adverse pregnancy outcomes after travel-associated exposure to ZIKV were sought, but data was scarce!

To help travelers take decisions, appropriate tools are needed to assist physicians in translating pre-test --> post-test probabilities.

Main objective: To present the diagnostic approach used at ITM for returning travelers from ZIKV endemic countries

Cross sectional, observational study of all travelers screened for ZIKV at the travel clinic (ITM)

- February –November 2016
- adults who travelled to regions of South or Central America with reported vector-borne transmission of ZIKV

Likelihood ratios were used to calculate Post-test probabilities for travelers of unknown prevalence of ZIKV infection (especially when asymptomatic)!

462 patients screened, 49 cases were diagnosed with ZIKV infection

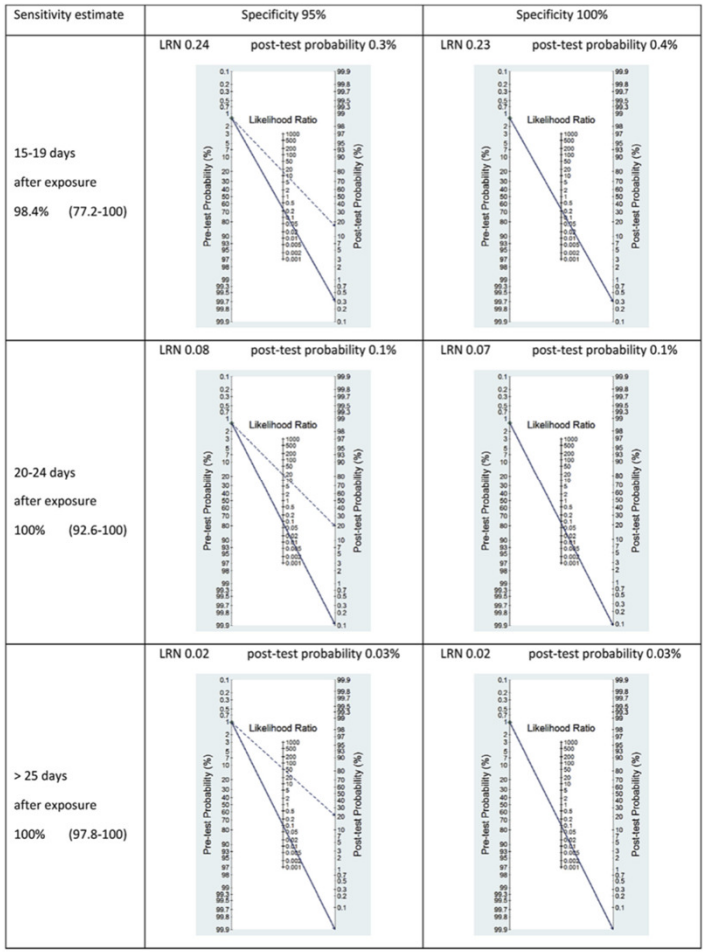


Fig. 1. estimated post-test probabilities for negative Zika virus antibody detection results in asymptomatic adults, at prevalence 1.3% Legend Fig. 1. We calculated the Negative Likelihood Ratio (LRN) using the reported specificity of the anti-ZIKV IgM/IgG Enzyme Linked Immunosorbent Assay (ELISA) (Euroimmun, Lübeck, Germany) was 100% (95%—CI [95.9–100.0]) (ref [18]). We calculated LRN for specificities of 95% and 100%. The sensitivity of anti -Zika antibody detection assays was estimated by adopting lower margins of the 95%-Credible Interval (95%—CrI) for seroconversion in function of the number of days post symptom onset (DPSO) from Lessler et al. and source data [11]. Therefore, with 95% certainty, the true post-test probability is lower than the reported values. The conservative estimates of post-test probabilities of Zika after negative results when tested at 15, 20 and 25 days after travel-associated exposure were calculated and plotted in Fagan nomograms (solid lines). Post-test probabilities of Zika after positive results are plotted only for specificity 95% (dashed lines). The Fagan nomogram consists of 3 vertical axes: the pre-test probability (left axis), the likelihood ratio (middle axis) and the post-test probability (right axis). (Fagan nomograms were created using Stata 14.2 ("FAGAN: Stata module for Fagan's Bayesian nomogram", Statistical Software Components S457060, Boston College Department of Economics), by Ben Dwamena, 2009.)

NLR= negative likelihood ratio

- The frequency of ZIKV infection was high in symptomatic travelers who were exposed during the outbreak in the Americas
- **Negative results** (ELISA IgM/IgG antibody assay) at **20-25 days** after travel-associated exposure allows clinicians to safely rule out ZIKV infection in clinical practice
- Allows for an **acceptable alternative to deferring conception to minimize risk of ZIKV congenital syndrome** in asymptomatic travelers returning to non-endemic areas.

Clinical Infectious Diseases

MAJOR ARTICLE

Drug-free Holidays: Compliance, Tolerability, and Acceptability of a 3-Day Atovaquone/Proguanil Schedule for Pretravel Malaria Chemoprophylaxis in Australian Travelers

Colleen L. Lau,[1,2] Lani Ramsey,[3] Laura C. Mills,[2] Luis Furuya-Kanamori,[1,4] and Deborah J. Mills[2]

3

Background:

- Malaria= most frequent diagnosis in cases of fever in returning travelers (21% cases, 33% fatalities) (data from 7000 patients from Geo-sentinel clinics)
- Poor compliance= major contributing factor to risk of malaria in travelers
- Standard treatment dose of atovaquone/proguanil 250/100 mg 4 tablets/d for 3 days provides protection against malaria for ≥ 4 weeks

Can 3-day schedule be used for pre-travel chemoprophylaxis?

CID 2019:69 (1): 137- 43.

- Multicentric, prospective, observational study
- Inclusion criteria:
  - Adults ≥ 18 years old
  - Travel to malaria endemic areas in Asia, Pacific Islands, or South/Central America for ≤ 4 weeks
- Exclusion criteria:
  - Concomitant medications
  - Pregnancy
  - Travel to Sub-Saharan Africa

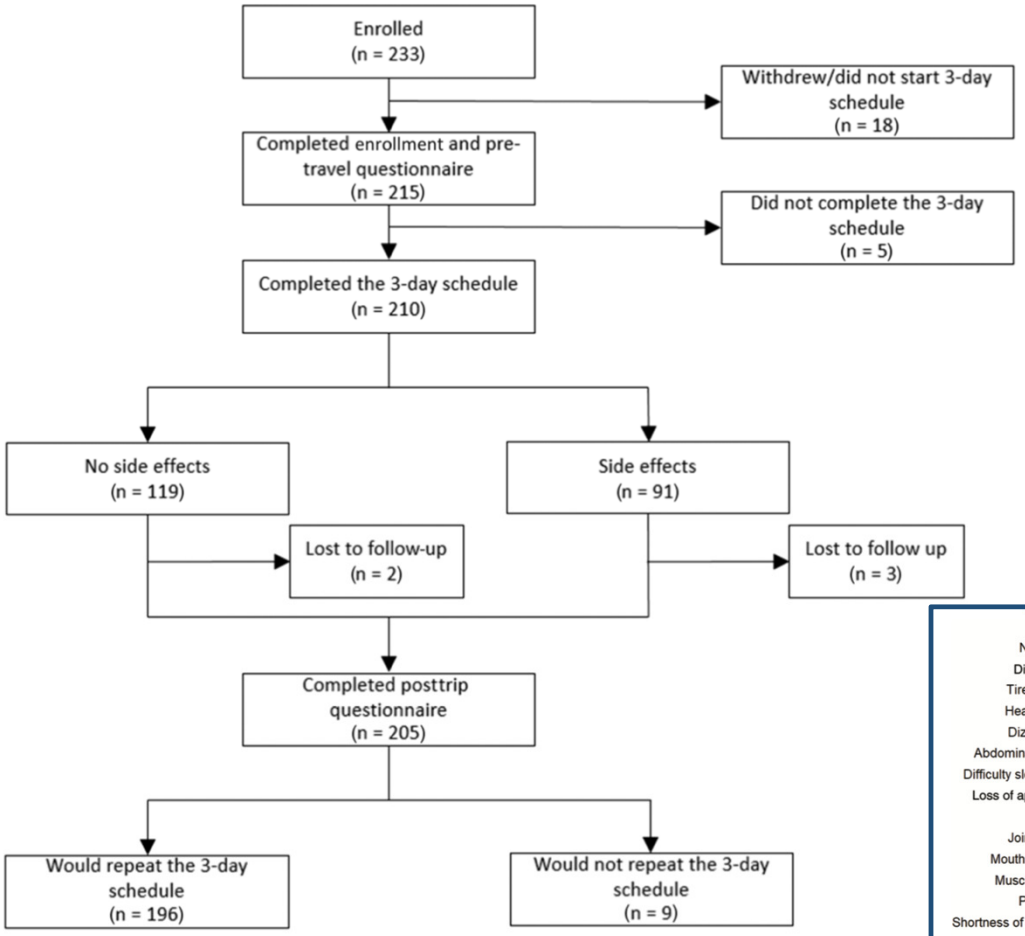


Figure 1. Participant enrollment and follow-up flowchart.

No patients diagnosed with malaria during or after travel!

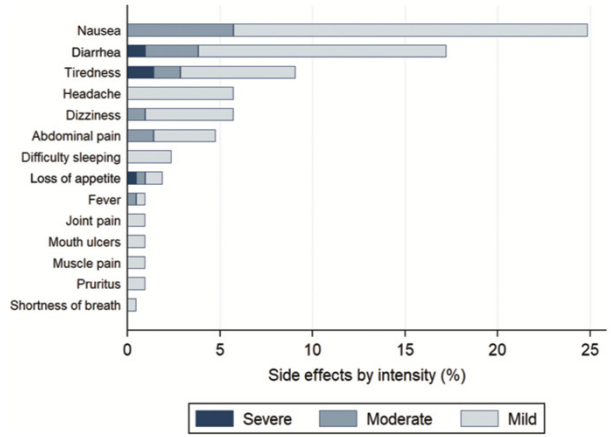
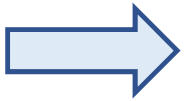


Figure 2. Percentage of participants who reported side effects, stratified by intensity.

Conclusions: 3-day Atovaquone/Proguanil schedule

- High compliance (> 97%)
- Well tolerated
  - Limited, mild side effects: 1-2 days, and resolved before departure
- Well accepted by travelers
- Cheaper than “standard prophylaxis”

- **<u>Nevertheless:</u>**
  - Compliance + acceptability were self reported
  - Study was not designed to study effectiveness of the 3-days schedule for prophylaxis



Further studies, including a larger sample size, + higher risk destinations will be required to confirm effectiveness in nonimmune travelers!

Clinical Infectious Diseases

MAJOR ARTICLE

Propensity Score Analysis of Artesunate Versus Quinine for Severe Imported *Plasmodium falciparum* Malaria in France

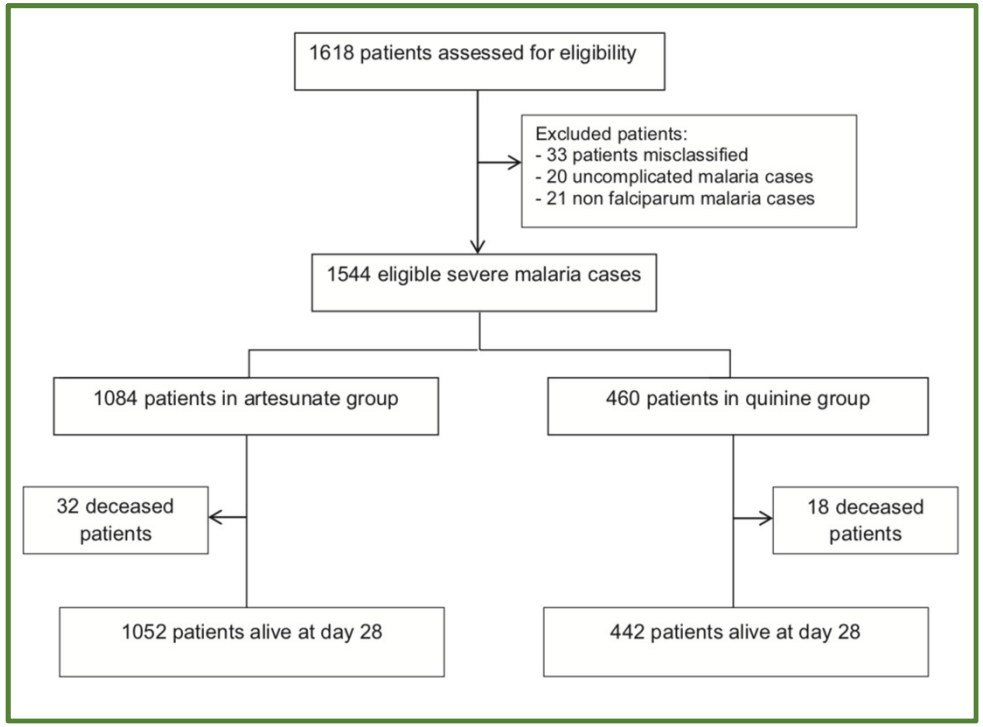
4

Nermine El Ket,[1] Eric Kendjo,[1,2] Marc Thellier,[1,2,3] Lambert Assoumou,[1] Valérie Potard,[1] Aida Taieb,[2,4] Ilhame Tantaoui,[2,4] Eric Caumes,[1,5] Renaud Piarroux,[1,2,3] Camille Roussel,[4,6] Pierre Buffet,[2,4,6] Dominique Costagliola,[1] and Stéphane Jauréguiberry[1,2,5]; for the French Artesunate Working Group

Background:

- Little is known on the use of artesunate compared with quinine for the treatment of imported malaria cases in nonendemic countries with a high level of care
- 2 treatments were compared in France (data from French National Reference Center) in terms of:
  - Mortality
  - Hospital + ICU discharge rates

Clin Infect Dis 2019. doi: 10.1093/cid/ciz206.

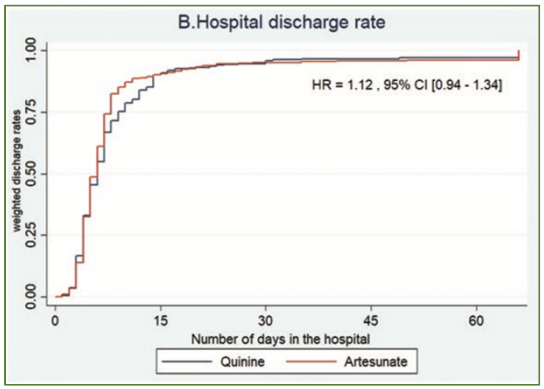


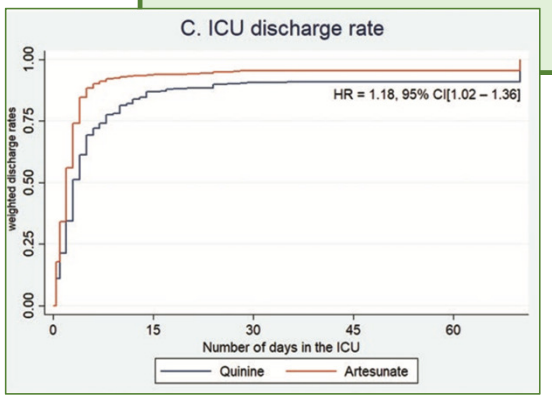
Strengths:

- Large sample size, coming from 110 centers throughout France

Limitations:

- Imported malaria is not a mandatory notifiable infectious disease in France
- The surveillance system relies on motivation of physicians to report data to the NRC --> available data were not complete
- Safety was not compared between 2 groups either





Clinical Infectious Diseases

MAJOR ARTICLE

Persistence of Imported Malaria Into the United Kingdom: An Epidemiological Review of Risk Factors and At-risk Groups

5

Qubekani M. Moyo,[1] Martin Besser,[2] Roderick Lynn,[2] and Andrew M. L. Lever[1,3]

Background:

- UK documented a decline of > 30% in imported cases of malaria annually between 1996-2003
- Worldwide: increase in imported and severe malaria cases from 2000-2015
- Still responsible for +/- 1700 cases/year in UK (5-10 deaths each year)
- Much morbidity is attributed to people VFR --> effort has been made to target this population

Objective: To evaluate whether the epidemiology has changed + whether health advice messages are targeting the right population.

- Retrospective review of patients with confirmed malaria seen in Cambridge University Hospital Foundation Trust: 2002 -2016

- Comparison with national data

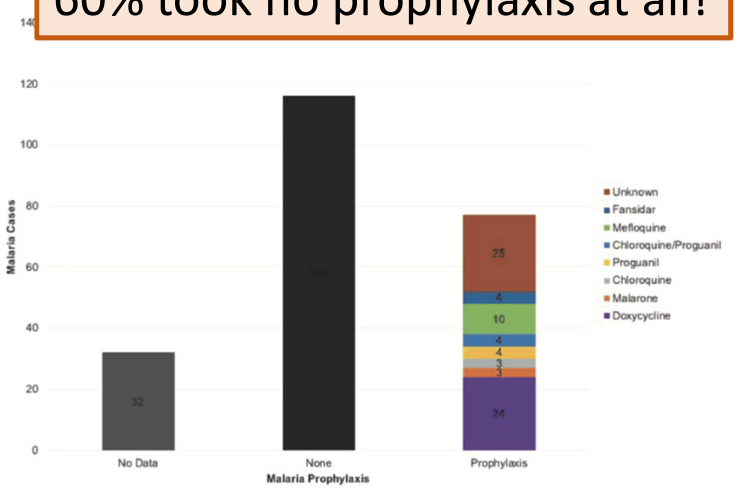
Results:

- 225 patients with confirmed malaria
  (67% due to P. falciparum)
- 15 cases/year: No decrease in cases/ year since 2004, similar to national trends
- Travel: West Africa (Ghana + Nigeria)

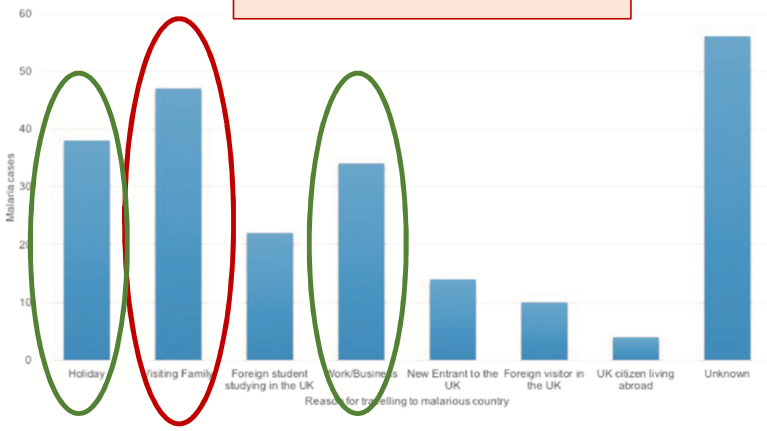
Conclusions:

- Significant number of travelers to countries endemic to malaria still take no chemoprophylaxis!
- Efforts need to be made to give health advice to:
  - VFR
  - Holiday and work

60% took no prophylaxis at all!



Reason for travel



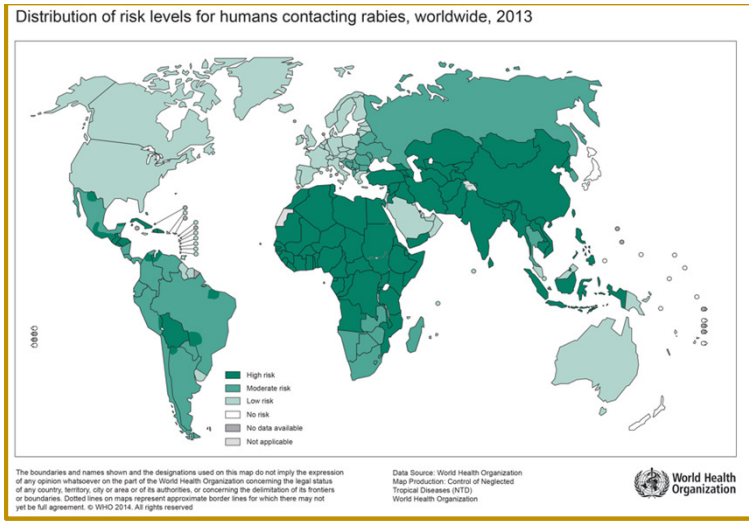
Clinical Infectious Diseases

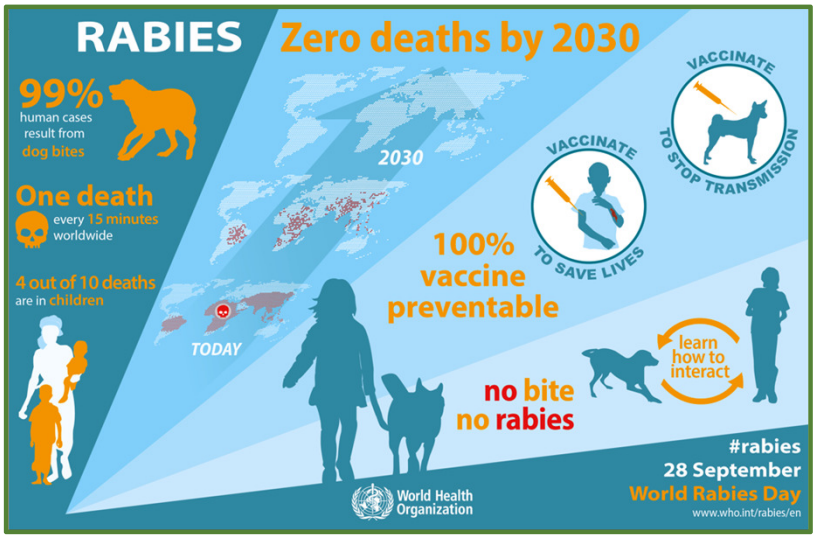
MAJOR ARTICLE

Preexposure Intradermal Rabies Vaccination: A Noninferiority Trial in Healthy Adults on Shortening the Vaccination Schedule From 28 to 7 Days

Patrick Soentjens,[1,2] Petra Andries,[1] Annelies Aerssens,[3,4] Achilleas Tsoumanis,[2] Raffaela Ravinetto,[5] Walter Heuninckx,[1] Harry van Loen,[2] Bernard Brochier,[6] Steven Van Gucht,[6] Pierre Van Damme,[7] Yven Van Herrewege,[2] and Emmanuel Bottieau[2]

6





Background:

- Rabies= neglected tropical disease
- Case-fatality rate= 100%
- Global annual death toll: +/- 61,000 cases (Asia + Africa)
- 40% of all bite exposures occurs in children (Asia + Africa)

- Rabies prevention: Preexposure prophylaxis (PrEP) using rabies vaccine

CID. 2019; 68: 607-614

Main objective: Noninferiority trial to compare immunogenicity 7 days after a single ID booster injection following 2 different priming schedules 1-3 years earlier (to mimic a true PEP situation)

- Double-dose ID 2 visit (D0 + D7), or
- Single-dose ID 3 visit (D0 + D7 + D28)

Assessment with:

- Rabies antibody titers measured with **rapid fluorescent focus inhibition test (RFFIT)**, > 0.5 IU/mL 7 days after booster vaccination injection 1-3 years after primary vaccination

- **Clinical non-inferiority**: loss of < 10% of subjects who have adequate rabies antibody levels compared to the 3 ID schedule

500 individuals randomized: 183 vs. 185 patients evaluated for immunogenicity on the 2 ID vs. 3 ID schedule

Table 3. Seroprotection Rates, Per-protocol Analysis, Day 7 After Booster Vaccination

Serology	3ID Schedule	2ID Schedule	% Difference (95% CI)[a]
Per-protocol analysis	n = 185	n = 183	
Subjects with serology >0.5 IU/mL	185/185 (100 [98–100])	183/183 (100 [98–100])	0 (–2.1 to 2)
No. of subjects with serology >10 IU/mL	154/185 (83 [78–89])	176/183 (96 [93–99])	13 (7–19)

Conclusions:

Noninferiority was confirmed!

(with 100% adequate antibody response)

- Other secondary endpoints:
  - Greater proportion of Participants with
    - long-lasting protection > 10 IU/mL (96 vs. 83%)
    - Geometric mean titer (GMT): 37 vs. 25
  - As safe as 3 ID schedule

New shortened ID schedules aim to be:

- Dose
- Time
- Cost sparing, while maintaining safety + efficacy

+ good news if vaccine shortages!

Contents lists available at ScienceDirect

Journal of Infection

journal homepage: www.elsevier.com/locate/jinf

Metagenomic next-generation sequencing aids the diagnosis of viral infections in febrile returning travellers

7

Hanna Jerome[a,1], Callum Taylor[b,1], Vattipally B. Sreenu[a], Tanya Klymenko[a], Ana Da Silva Filipe[a], Celia Jackson[c], Chris Davis[a,*], Shirin Ashraf[a], Eleri Wilson-Davies[c], Natasha Jesudason[d], Karen Devine[b], Lisbeth Harder[a], Celia Aitken[c], Rory Gunson[c], Emma C. Thomson[a,b,*]

Background:

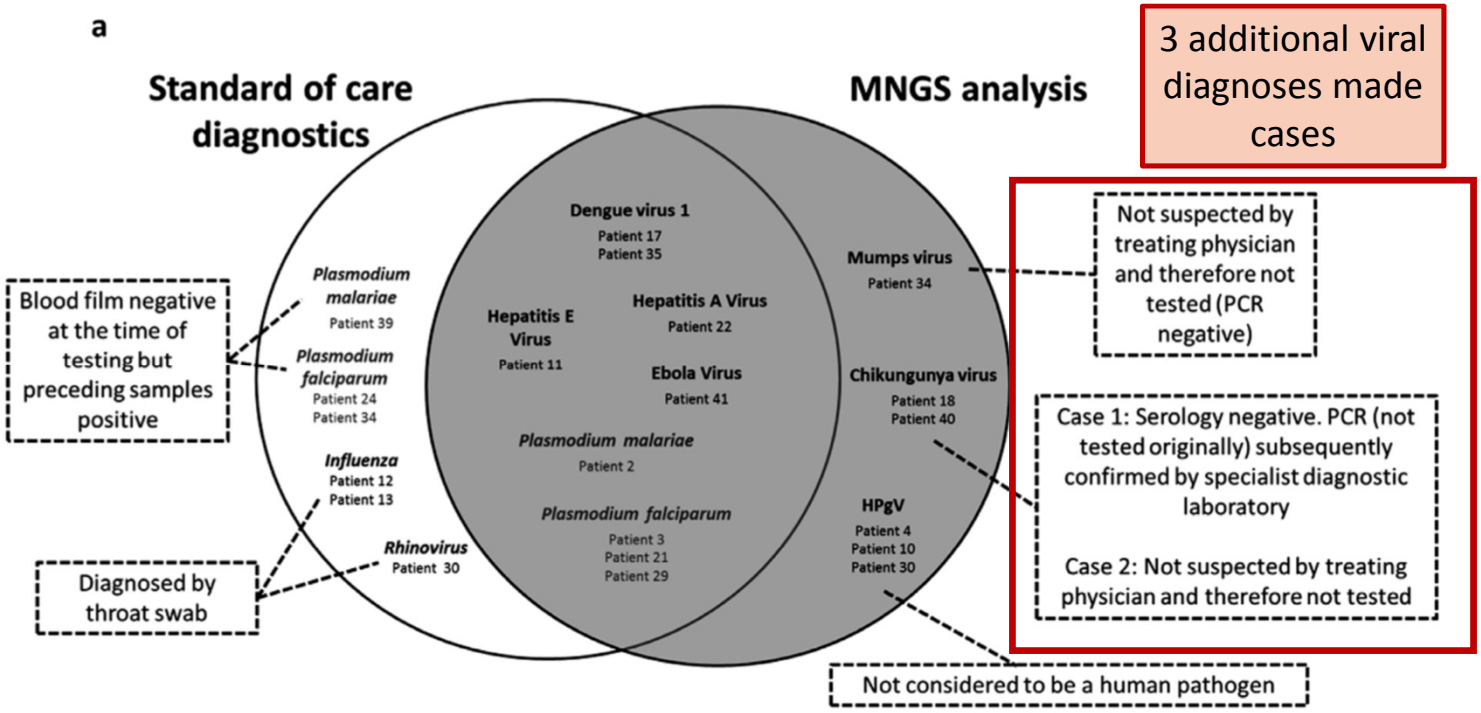
- The increase in international travel has increased the potential for transmission of a wide range of viruses
- Traditional diagnostic tests:
  - require a priori knowledge of pathological agents
  - Are often batched
  - Sent to a reference laboratory
- Metagenomic next-generation sequencing (MNGS) may help:
  - Identify new or emerging infections (+ those not considered by the treating physician)
  - Resistance screening
  - Detect multiple pathogens in a single sample

J Infection. 2019. 79: 383-388.

Objective: Proof-of-concept study to use MNGS to identify viral pathogens in clinical samples from returning travelers in a single center to explore suitability as a diagnostic tool

Methods: Retrospective use of samples from patients admitted with a febrile illness following overseas travel within 12 weeks of presentation to hospital from 2013- 2016

- MSNG analysis was performed
- Diagnoses made by 2 blinded physicians (ID physician + laboratory scientist with expertise in NSG data analysis) prior to comparison with clinical data
- Confirmatory testing carried out by PCR or serology in the West of Scotland Specialist Virology Center



Conclusions:

- MNGSs has the potential to improve diagnostic yield of viral, bacterial + parasitic infectious diseases
- The requesting physician does not need to consider all DD possibilities

Limitations:

- The method is designed to detect RNA viruses --> it is likely to detect DNA viruses with an RNA stage in the life cycle, but with reduced sensitivity!
- CSF, respiratory + urine samples were not often tested
- Sensitivity of MSNGs for detection of each pathogen identified in this study has not been performed

Contents lists available at ScienceDirect

Travel Medicine and Infectious Disease

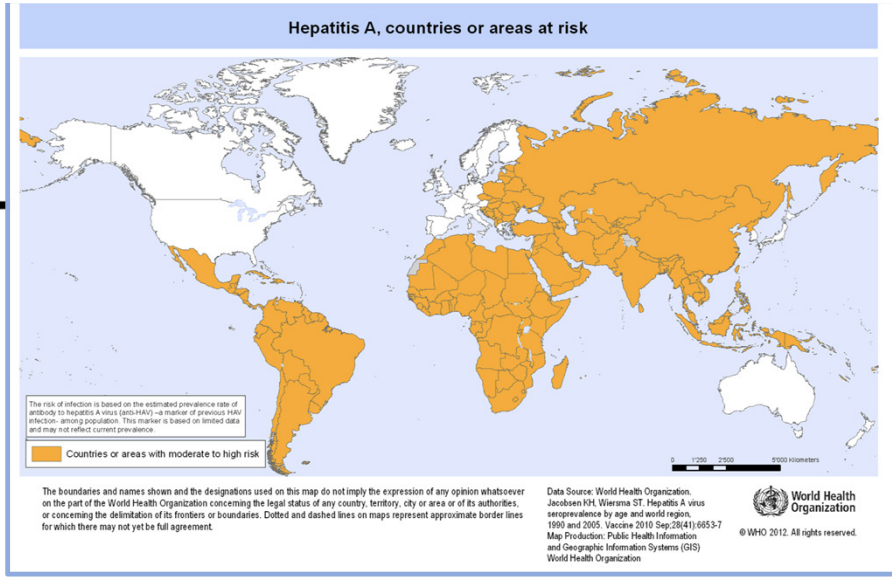
journal homepage: www.elsevier.com/locate/tmaid

Hepatitis A vaccine immunogenicity in patients using immunosuppressive drugs: A systematic review and meta-analysis

8

Hannah M. Garcia Garrido[a,*], Ati M. Veurink[a], Mariska Leeflang[b], René Spijker[c,d], Abraham Goorhuis[a], Martin P. Grobusch[a]

[a] Amsterdam UMC, University of Amsterdam, Centre of Tropical Medicine and Travel Medicine, Department of Infectious Diseases, Meibergdreef 9, Amsterdam, the Netherlands
[b] Amsterdam UMC, University of Amsterdam, Department of Clinical Epidemiology, Biostatistics and Bioinformatics, Amsterdam Public Health, Meibergdreef 9, Amsterdam, the Netherlands
[c] Amsterdam UMC, University of Amsterdam, Medical Library, Amsterdam Public Health, Meibergdreef 9, Amsterdam, the Netherlands
[d] Cochrane Netherlands, Julius Center for Health Sciences and Primary Care, UMC Utrecht, Utrecht University, Utrecht, the Netherlands



Background:

- Patients taking immunosuppressive treatments are more likely to travel to exotic destinations
- HAV is a common vaccine-preventable disease in travelers
- Reasons for looking at IS travelers:
  - Many IS travelers are > 40 years old --> increased case-fatality rate compared to younger individuals
  - Prolonged viral shedding upon HAV infection --> risk of outbreaks
  - Inactivated HAV vaccines:
    - Safe
    - Highly immunogenic, response rates of 100% after a single dose in immuno-competent individuals
- Immune response following HAV vaccination involve cellular + humoral pathways, but antibodies alone are protective against infection

Hannah M et al. Travel Medicine and Infectious Disease, http://doi.org/10.1016/j.tmaid.2019.101479

Objectives:

- What are the seroconversion rates after 1 and 2 doses of HAV vaccine?
- What is the strength of the humoral immune response in geometric mean antibody concentration
- Are there differences in SCRs between IS regimens?
- Are alternative vaccination regimens superior to the established 2 dose regimen?
- What is the duration of protection after successful vaccination?

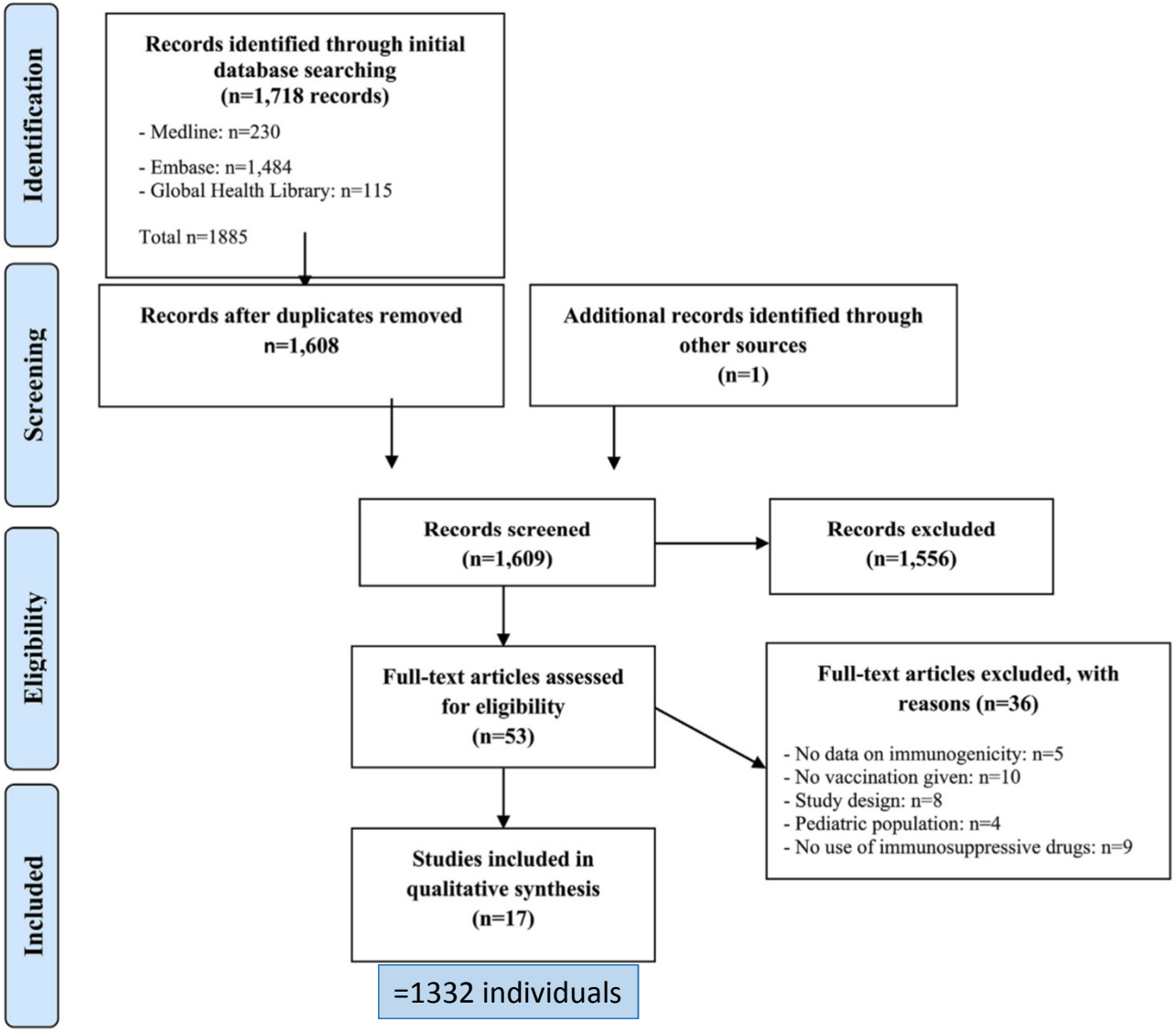


Fig. 1. PRISMA flowchart of study selection process.

Results:

- Differences in IS regimens:
  - Anti-TNF > conventional immunomodulatory (cIM)> organ transplant patients
  - No data on other non anti-TNF biologicals
- Seroconversion rates:
  - Rituximab: 0--> 47%
  - Anti-TNF + cIM: 6-100%; 48-100%
  - SOT: 0-67%; 0-97%
- Alternative vaccination regimens?
  - 1 single study in RA patients: 2 doses + 1 vs. 1-1-1 schedule, but no control group of IS patients receiving standard regimen
- Duration of protection after successful vaccination?: no conclusions because too few data

Limitations: Great heterogeneity of SC rates between studies: 0--> 100%

- Age
- Different IS regimens (dose, number of IS drugs)
- The serological assay used
- Serological cut-offs: from 10 --> 40 mIU/mL
- Different vaccines used across studies (Havrix®, Vaqta®, Epaxal®), different SCRs have been reported for different vaccines

Conclusions: overall, evidence is of low quality

- Impaired immune response to the 2 dose vaccination regimen in patients receiving IS therapy , especially after 1 single dose
- Vaccination before start of IS therapy! (long term serological protection after is not guaranteed!
- Antibody measurement after vaccination is needed before travel to endemic regions
- Protective antibodies after vaccination in IS patients may take longer --> 6-8 weeks between antibody assessment + vaccination
- Alternative vaccination regimens: Extra doses of vaccines: only 1 study in 54 patients!
  - Well tolerated
  - Generate excellent short-term seroconversion rates in RA patients with mild IS regimens
  - More studies needed in other patient categories

Microbiome and Antimicrobial Resistance Gene Dynamics in International Travelers

9

Charles Langelier, Michael Graves,[1] Katrina Kalantar,[1] Saharai Caldera, Robert Durrant, Mark Fisher, Richard Backman, Windy Tanner, Joseph L. DeRisi, Daniel T. Leung

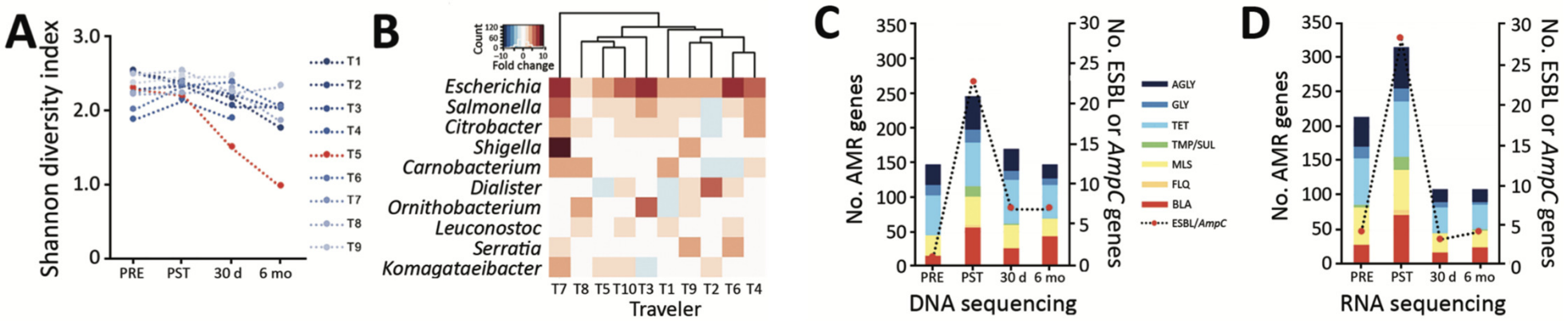
Main objective: To clarify AMR exchange during global travel using metagenomic next generation sequencing (mNGS) to asses composition of gut microbiota + the antimicrobial resistome

Background:

- Intl travel is a known contributor to the emergence of organisms with antimicrobial resistance (AMR)
- Colonization with resistant pathogens acquired during travel can persist for extended periods of time --> transmission into environment + susceptible populations
- Mechanisms underlying acquisition of AMR bacteria are not completely understood
- Hypothesis: changes in the microbiota may play a role?

Emerging Infectious Diseases • www.cdc.gov/eid • Vol. 25, No. 7, July 2019

Total number of AMR genes identified with ≥ 20% allele coverage by DNA and RNA sequencing



<u>Conclusions</u>: the enteric microbiota and resistomes of returned travelers were analyzed:

- a marked increase in AMR genes that was associated with an increased proportion of *Escherichia spp.* Bacteria
- Persistent ESBL colonization was observed after 6 months --> travel can induce long-term changes in the antimicrobial resistome
- mNGS identified a number of other AMR gene classes that increased in abundance after travel
- Changes in microbiome diversity were not associated with ESBL positivity at 30 D or 6 months post-travel--> **disruption of the antimicrobial resistome can occur in the setting of a preserved microbial community structure!**
- Limitations: small sample size

Contents lists available at ScienceDirect

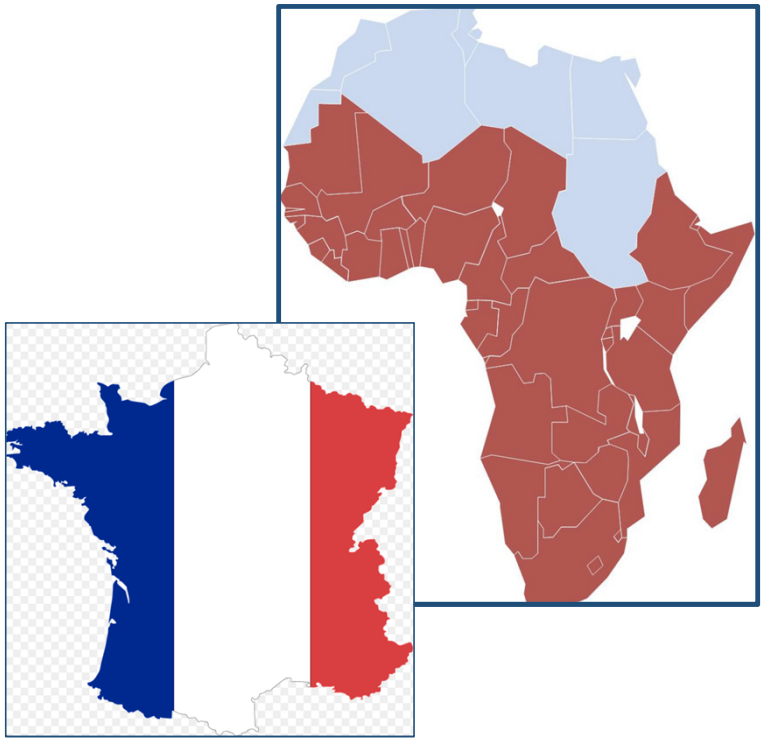
Travel Medicine and Infectious Disease

journal homepage: www.elsevier.com/locate/tmaid

Travel-related health events and their risk factors in HIV-infected sub-Saharan migrants living in France and visiting their native country: The ANRS VIHVO cohort study

10

Thierry Pistone[a,b,*], Eric Ouattara[a,b], Delphine Gabillard[b], Nathalie Lele[c,d], Alexandre Duvignaud[a,b], Hugues Cordel[c,d], Denis Malvy[a,b], Olivier Bouchaud[c,d], Sophie Abgrall[e,f], ANRS VIHVO Study Group (Michele Bentata[g], Bruno Fantin[h], Cécile Goujard[i], Sophie Matheron[j], Odile Launay[k], Vincent Le Moing[l], Olivier Lortholary[m], Paul- Henri Consigny[n], Matthieu Saada[o], Christine Katlama[p], Anne Simon[p], Cédric Arvieux[q], Pauline Campa[r], Pierre-Marie Girard[r], Marie-Aude Khuong[s], Jean-Michel Molina[t], Caroline Lascoux-Combe[t], David Rey[u], Murielle Rondeau[u], Gilles Pialoux[v], Carine Couzigou[w], Daniel Vittecoq[w], Olivier Patey[x], Philippe Morlat[y], Michel Duong[z], Pascal Chavanet[z])



Background:

- +/-5.8 million migrants live in France
- 670,000 were born in sub-Saharan Africa (SSA)
- Migrants of SSA constitute 23% of the HIV-infected individuals in France
- Quality of life of HIV-infected individuals has markedly improved since introduction of cART

→HIV-infected SSA migrants travel more frequently to their native countries for long travel duration

- Data on travel-related health problems of HIV-infected persons that visit tropical regions are scarce
- No studies have focused on HIV-infected SSA migrants living in a Western country who visit their country of origin

Travel Medicine and Infectious Disease. 2019. 29: 40-47

Main objective: To describe travel-related health events and their risk factors in ` HIV-infected SSA migrants included in the ANRS VIHVO study

- Prospective study from July 2006 --> June 2009
- Patients enrolled: 268 HIV-infected migrants (natives of SSA) who travelled within 8 weeks of their visit to their native country for > 2 week, but < 6 months

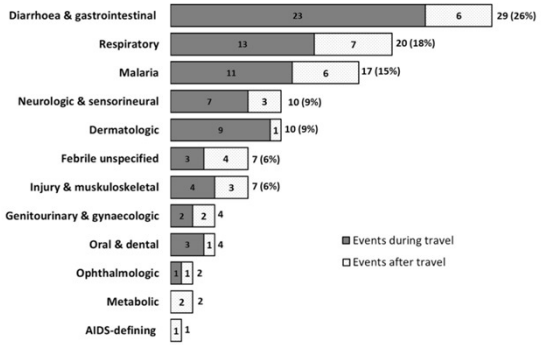


Fig. 1. Travel-related health events according to the timing of occurrence during or after travel in 264 HIV-infected sub-Saharan migrants living in France and visiting their native country, the ANRS VIHVO study (2006–2009).

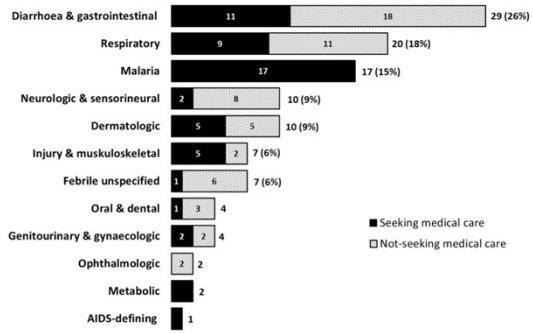


Fig. 2. Travel-related health events according to medical-care-seeking behaviour in 264 HIV-infected sub-Saharan migrants living in France and visiting their native country, the ANRS VIHVO study (2006–2009).

- 38% of 264 HIV-infected SAA migrants living in France experienced > 1 travel-related event during travel to their native country, lower than the 64-87% of health events reported in the general population of Intl travelers to resource-limited countries
- Medical care was sought in 50% of the events
- Most common events: diarrhea > respiratory symptoms> malaria –related events

Results:

- Low reported adherence rates to vector control measures + malaria chemoprophylaxis

- Patients at greatest risk for a travel-related health event:
  - low-level pre-travel viremia
  - No pre-travel medical advice on diarrhea + vector-borne diseases

4x more frequent than if undetectable pre-travel viremia + pretravel advice

- 11% decrease in cART adherence during travel:
  - Lower socio-economic conditions
  - Negative perception about cART effectiveness
  - Prolongation of the stay
  - Unexpected traumatic events during stay

Conclusions: counselling needs to focus on adherence to pre-travel medical advice regarding prophylactic measures for:

- diarrhea and
- vector borne diseases


Thank you for your attention!
Bon Voyage!