

# Medical Tourism and the Risk of Infection or Colonization with Antibiotic-Resistant Organisms: A Literature Review

Christine Luxemburger,<sup>1</sup> Liz Temkin,<sup>2</sup> Yehuda Carmeli<sup>2</sup>

<sup>1</sup>Sanofi Pasteur, <sup>2</sup>Tel Aviv Sourasky Medical Center

## Introduction

- Medical tourism can be defined as the process of travelling abroad for receiving healthcare.
  - From low-income countries to countries with advanced healthcare technologies
  - From developed to middle-income countries because of lower cost
  - For legal reasons (especially for reproductive care)
- The quantification of medical tourism is extremely difficult. Despite scarcity of data, medical tourism is perceived as a potential source for the spread of multidrug-resistant organisms (MDROs).
- Study aims
  - To quantify the frequency of medical tourism
  - To identify cases of MDR pathogens imported into a country by patients returning from medical tourism

## Materials and methods

- We search MEDLINE for articles published in 2006 to June 2016. Primary search terms were “medical tourism (MT)” and “infection”, second search terms were “MT review” or “MT tourism statistics” or “MT impact” or “MT ethics” or “MT India” or “MT Thailand.”
- We reviewed titles of retrieved articles and excluded if: focused on travel medicine, non-human studies, basic research, not in English, French or Spanish, no abstract.
- We reviewed abstracts and excluded if focused on: qualitative research, ethics, impact on destination health structures and/ or health workers, stem cell transplantation, bariatric or cosmetic surgery, dental care.
- Full texts were assessed for eligibility:
  - Excluded: review papers, papers that focused on cost of MT or mycobacterial infections
  - Included papers that aimed to quantify MT if the study was performed in a well-defined population. Excluded papers that gave global estimates without generating or analyzing data.
  - Included papers that described infections or colonization if the travel was documented as “MT.” Excluded if non-specified travel or emergency medical care while abroad.
  - Added 3 relevant papers published before 2006.
- We searched websites of national or regional public health institutions for additional data.

## Results (1)

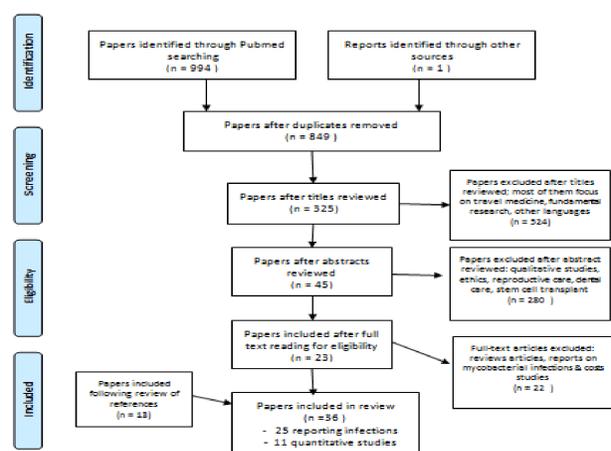


Figure 1 PRISMA flow diagram for literature review medical tourism.

## Results (2)

### Studies on the frequency of medical tourism (N=11)

- 3 studies reported data from **surveys**, including:
  - Survey of medical tourism companies - estimated 13,500 US patients going abroad each year. This was far lower than the numbers usually reported (500,000-2 M per year), but did not include patients seeking care independently.
- 5 studies reported a **single centre or country experience**, including:
  - Thailand - survey estimated 167, 000 medical tourists per year (10 times lower than previous estimate).
  - Nationwide survey in UK estimated 63,000 residents travelling for treatment, and 52,000 foreign patients seeking treatment.
  - Nationwide survey in Denmark estimated that 7% of native Danes (vs. 27% of Turkish immigrants in Denmark) had crossed the border for healthcare.
- 3 studies on **trends for transplant tourists**, including:
  - In US, only 0.07% of patients on the national waiting list were removed because they had received foreign transplants

### Studies on infection or colonization with MDRO in patients returning from medical tourism (N=25)

- 17 studies on outcomes of **transplantation** abroad
  - Case studies of single patients who acquired carbapenem-resistant *Acinetobacter baumannii*, NDM-producing *Klebsiella pneumoniae*, MDR *E.coli*, or ESBL-producing *E.coli*
  - 1 case of a medical tourist causing a local outbreak: an Israeli receiving a liver transplant in Columbia was the index case in an outbreak of KPC-3-producing *Klebsiella pneumoniae* in Colombia involving 84 patients
  - Most studies lack of denominator and a case definition of infections.
- 7 studies on **other healthcare procedures**
  - Case series or single cases of medical tourists infected with MDROs, including OXA-48-producing *Enterobacteriaceae*; NDM-1-positive *E.coli*; VIM-27-producing *Klebsiella pneumoniae*
- 1 study on **colonization**
  - Hong Kong: screened all patients with history of medical tourism within the past year. CRE fecal carriage was 1.2%

## Conclusions/Discussion

• This review confirmed that there are huge knowledge gaps regarding the frequency of medical tourism. Although there is a perception of a large and growing number of patients travelling for medical tourism, the data are scarce and the estimates of the few observational studies are lower than expected.

• Reports of infection following medical tourism were rare; we could not quantify the importance of these potential sources of infections because most studies lacked denominators and comparators.

• The role of medical tourism in the international spread of MDROs might be overestimated. In particular, there might be a much lower risk of infection in patients going abroad for planned surgery or treatment than in those who are treated abroad for emergencies, sudden illnesses or trauma.