

## A closer look at travellers' infections abroad: Finnish nationwide data with incidences, 2010 to 2012



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### ARTICLE INFO

#### Article history:

Received 1 September 2016

Received in revised form

8 October 2016

Accepted 18 October 2016

Available online 21 October 2016

#### Keywords:

Travel

Incidence

Morbidity

Infection

Traveller's diarrhoea

Respiratory infection

Vaccine-preventable

### ABSTRACT

**Background:** Although infections represent the most common health problem of travellers abroad, data on morbidity and incidences of various infections are scarce.

**Method:** Data on infections of Finnish travellers during 2010–2012 were retrieved from the database of SOS International, an assistance organization covering 95% of Finns requiring aid abroad. The study included 30,086 cases. For incidence calculation, the data were linked to the numbers of Finns visiting these regions during the same period as recorded by the Official Statistics of Finland.

**Results:** The incidence of infections was particularly high in Africa, southern Europe plus the eastern Mediterranean, and Asia plus Oceania. The most frequent diagnoses were acute gastroenteritis (38.0%) and respiratory-tract infections (RTI) (34.5%), followed by infections of the ear (12.6%), skin or subcutaneous tissue (5.1%), urogenital tract (4.2%), eye (3.1%), and systemic febrile infections (2.2%). Vaccine-preventable diseases (VPD) accounted for 0.8% of cases, with varicella as most (49%) and influenza as second-most (27%) common.

**Conclusions:** Incidence of infections was higher in southern than in eastern and western Europe. Gastroenteritis and RTI proved the most frequent diagnoses, whereas systemic febrile infections were uncommon. Despite pre-travel immunizations, VPDs still occurred; pre-travel consultation should cover both varicella and influenza.

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## 1. Introduction

International travel has, in recent decades, increased substantially; annual international tourist arrivals are expected by 2030 to reach 1.8 billion, with travel to emerging economies increasing at twice the pace of travel to advanced regions [1]. Accordingly, travellers are anticipated to cause a rising burden on health care systems both in the regions visited and in their home countries after return. Over half the visitors to developing countries have been reported to fall ill, and 8% to require medical attention [2]. Less

data are available on travel to developed countries. Recently, we showed that more than half of all health problems during travel are infections [3].

Most studies present the proportionate morbidity of returning travellers, often reporting data from centres specialized in travel and tropical medicine [4–15]. As for health problems while abroad, data have been collected mainly after travellers' return [2,16–20], with figures recorded during the actual journeys being scarce [21–23]. Until recently, reports on incidences, meaning cases related to numbers of travellers to each region, have been lacking [24].

The largest group among all international travellers are the Europeans. Even though they represent only 10% of the world population, they are responsible for half of world's international arrivals [1]. Our earlier report [3] presented data on 50,710 Finnish travellers with health problems abroad, as retrieved from an assistance organization (SOS International) covering 95% of Finns requiring aid abroad. In addition to presenting proportionate morbidity, we combined those data with the annual numbers of

*Abbreviations:* OSF, the Official Statistics of Finland; RTI, respiratory-tract infections; SOS, SOS International; TD, travellers' diarrhoea; VPD, vaccine-preventable disease.

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travellers to various destinations that are recorded in the Official Statistics of Finland (OSF) [25], enabling calculation of incidence of illness and injury during travel. The study not only found significant differences in incidences between geographic regions, but also demonstrated that infections (60%) outnumber all other health problems. We now revisit these data to study the incidences of infections in various geographic regions and to examine their types in more detail.

## 2. Methods

### 2.1. Assistance organization data

SOS International (SOS), serving Nordic and Baltic insurance companies, provides travellers with 24-h emergency assistance: advice, medical evaluation, referral to treatment, cost coverage and arrangement of transportation if indicated for medical reasons. SOS covers approximately 95% of all Finnish cases (77% of inpatients, 99.8% of outpatients) handled by assistance organizations of insurance companies abroad [3]. The study material covers Finnish travellers that used health care services abroad and were reported to SOS. Coordinating doctors are assigned to 86% of inpatient and 1% of outpatient cases [3]. They stay in contact with patient and clinician abroad, examine medical reports, evaluate treatment, and give orders for repatriation. Non-medical assistance coordinators see to the uncomplicated inpatient, and to 99% of outpatient cases, recording diagnoses provided by clinicians abroad [3]. Earlier, we retrieved data on all cases, 1 January 2010 to 31 December 2012, a total of 50,710. For the present study we selected only those cases diagnosed with infection (Fig. 1).

All SOS data are processed in a computerized database and comprised information on age, sex, time and country of illness, inpatient or outpatient status, main diagnosis, repatriation, and death. Research permission came from SOS.

### 2.2. OSF data

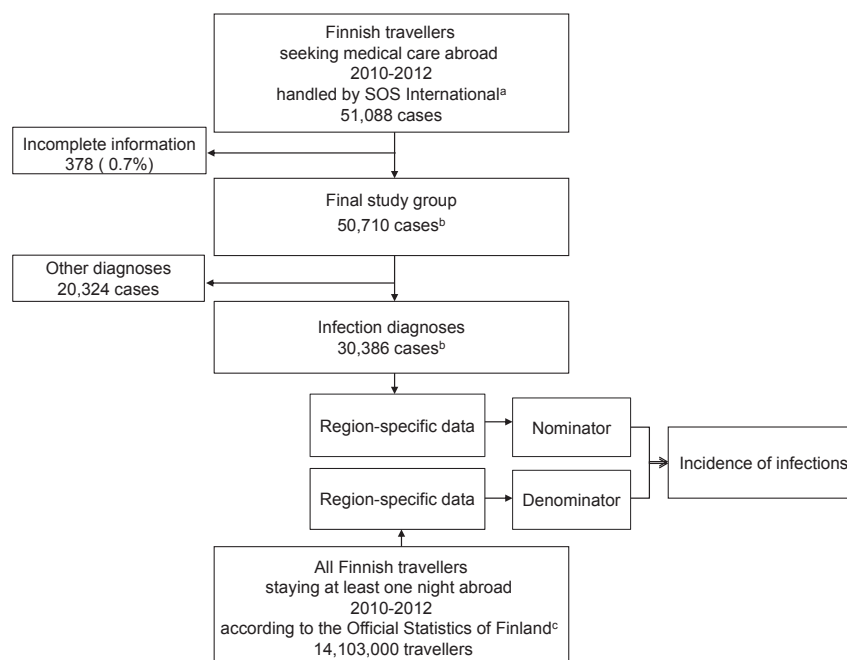
The OSF data on Finnish travellers comprise annual numbers and median duration of at-least-overnight leisure, business and professional visits abroad, and travellers' age groups by region and country. The initial data collection included monthly sample-based computer-assisted telephone interviews with Finnish residents aged 15–74 years; in 2012, the upper age limit was extended to 84 years. The samples, systematically drawn from the central population register, totalled 26,400 individuals annually in 2010 and 2011, and 28,200 in 2012 [25].

### 2.3. Definitions

A case was defined as a Finnish traveller abroad with one episode of illness that received a diagnosis of infection, a case handled by SOS during 2010–2012. Anyone with several separate episodes was thus counted more than once. Repatriations were grouped based on manner of return: as planned, by air ambulance, or by other rearranged transport.

### 2.4. Diagnoses

Coordinating doctors had encoded the diagnoses, applying the International Statistical Classification of Diseases and Related Health Problems 10th revision (ICD-10) [26]. Assistance coordinators had recorded them as open text. For the present study, a single coordinating doctor, one of the researchers (HS), encoded these diagnoses applying ICD-10. We separated infection diagnoses from the ICD-10 organ-specific classification into a category of their own and classified them further under the following subcategories: acute gastroenteritis, respiratory tract infections, infections of the ear, infections of the skin or subcutaneous tissue (dermatologic infections), infections of the urogenital tract, infections of the eye, systemic febrile infections, and other infections.



**Fig. 1.** Study population and calculation of incidence. <sup>a</sup> SOS International (SOS), serving Nordic and Baltic insurance companies, provides travellers with 24-h emergency assistance abroad: advice, medical evaluation, referral to treatment, cost coverage, and arrangement of transportation if indicated for medical reasons. SOS covers approximately 95% of all Finnish cases (77% of inpatients, 99.8% of outpatients) handled abroad by assistance organizations [3]; records for 2010–2012 were included in this analysis. <sup>b</sup> Data retrieved from [3]. <sup>c</sup> Overnight leisure and business trips abroad; includes travellers 15–74 years of age in 2010–2011, and travellers 15–84 years of age in 2012 [25].

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