Travel Medicine and Infectious Disease xxx (xxxx) xxx–xxx

Contents lists available at ScienceDirect

Travel Medicine and Infectious Disease

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

One-sixth of inpatients in a Danish infectious disease ward have imported diseases: A cross-sectional analysis

Fredrikke Dam Larsen[a,*], Sanne Jespersen[a], Christian Wejse[a,b], Eskild Petersen[c,d], Carsten Schade Larsen[a]

[a] Department of Infectious Diseases, Aarhus University Hospital, Palle Juul-Jensens Boulevard 99, 8200 Aarhus N, Denmark
[b] GloHAU, Department of Public Health, Section of Global Health, Aarhus University, Bartholins Allé 2–Building 1260, 8000 Aarhus C, Denmark
[c] Department of Clinical Medicine, Faculty of Health Sciences, Aarhus University, Denmark
[d] Department of Infectious Diseases, The Royal Hospital, Muscat, Oman

ARTICLE INFO

Keywords:
Travel
Infection
Disease
Febrile
Migration

ABSTRACT

Background: The aim of the study was to describe travel demographics and disease patterns of patients hospitalized with travel-related diseases, and assess risk factors to improve pre-travel information and post-travel diagnostics and treatment.

Methods: The study included all patients hospitalized with travel-related diseases in 2015 at a Danish infectious diseases ward. Patient data was extracted from the in-patient hospital registry. was analyzed regarding diagnoses, destination, purpose of travel and pre-travel information.

Results: 240 patients were hospitalized with a total of 289 travel-related diseases, accounting for 16.6% (240/1450) of all admissions. Febrile illnesses were the most common (39.5%, 114/289) followed by respiratory (19.7%, 57/289) and gastrointestinal diagnoses (19.0%, 55/289). Most of the diseases were acquired in Sub-Saharan Africa (35.6%, 103/289) followed by South East Asia (27.0%, 78/289), and 60.0% (144/240) of the patients were tourists. One-third (36.3%, 81/223) of the non-migrants had received pre-travel information. The lowest rate was seen in people visiting friends and relatives (18.2%, 6/32).

Conclusion: Travel-related diseases are common among patients admitted to this Danish infectious disease ward. Malaria is the most common disease among both travelers and immigrants. In approximately one third of all the patients in our study etiology was unknown.

1. Introduction

International travel is increasing. In 2015, 14 million passengers had an international flight from a Danish airport, an increase of 36.7% compared to 2005 [1,2]. In 2000, 37.7% of all international travels went to low income countries, while the number had risen to 45.3% in 2015 [3].

In addition to increasing travel activities, immigration is increasing. In 2015, a total of 69,400 persons without a Danish or Nordic citizenship immigrated to Denmark, which is 17% more than in 2014 [4]. Of these, 21,316 were asylum seekers, compared to 14,732 and 5115 in 2014 and 2010, respectively [5]. The higher number of immigrants leads to an increase in number of people travelling to visit friends and relatives (VFR). Compared with people travelling for other reasons, VFRs have a higher risk of contracting infectious diseases [6,7].

The aim of this cross-sectional study was to describe travel demographics and disease patterns of patients hospitalized with travel-related diseases in a department of infectious diseases in Scandinavia. In addition, we aimed to describe characteristics and risk factors of travel-related diagnoses, as well as to document the frequency of pre-travel information.

2. Material and methods

2.1. Data source

Department of Infectious Diseases at Aarhus University Hospital, a regional referral hospital, is a member of the GeoSentinel Surveillance network, which globally includes 66 medical clinics and gathers information about travel-related diseases [8]. The uptake area of the department is the Central Denmark Region covering 1.3 million people.

Data on all patients hospitalized with travel-related diseases was extracted from patients' files and entered into the GeoSentinal

* Corresponding author.
E-mail addresses: frelarse@rm.dk (F. Dam Larsen), sanne.jespersen@clin.au.dk (S. Jespersen), wejse@dadlnet.dk (C. Wejse), eskildp@dadlnet.dk (E. Petersen), carsten.schade.larsen@dadlnet.dk (C.S. Larsen).

http://dx.doi.org/10.1016/j.tmaid.2017.10.012
Received 7 May 2017; Received in revised form 15 October 2017; Accepted 20 October 2017

Table 1
Travel demographics.

Variables	Total	Gastro-intestinal Diagnoses	Febrile Illness	Respiratory Diagnoses	Dermatological Diagnoses	Neurological Diagnoses	Genito-urinary Diagnoses + STD
Patients, n* (%)	240	52 (21.7)	112 (46.7)	52 (21.7)	13 (5.4)	11 (4.6)	19 (7.9)
Diagnoses, n*(%)	289**	55 (19.0)	114 (39.5)	57 (19.7)	14 (4.8)	11 (3.8)	20 (6.9)
Age, median (range)	39	37 (18–68)	39 (14–81)	39 (16–93)	46 (21–61)	51 (24–74)	47 (18–81)
Sex, n (%)							
Male	135 (56.3)	30 (57.7)	69 (60.5)	31 (59.6)	10 (76.9)	3 (27.3)	4 (21.0)
Travel Region, n (%)							
Western Europe	34 (11.8)	4 (7.3)	5 (4.4)	16 (28.1)	1 (7.1)	5 (45.5)	1 (5.0)
Eastern Europe	10 (3.5)	4 (7.3)	3 (2.6)	2 (3.5)	0 (0.0)	0 (0.0)	0 (0.0)
North Africa& Middle East	13 (4.5)	4 (7.3)	6 (5.2)	3 (5.3)	0 (0.0)	1 (9.1)	0 (0.0)
Sub-Saharan Africa	103 (35.6)	19 (34.6)	47 (41.2)	15 (26.3)	3 (21.4)	2 (18.2)	8 (40.0)
South Central Asia	23 (8.0)	4 (7.3)	11 (9.7)	3 (5.3)	1 (7.1)	0 (0.0)	2 (10.0)
South East Asia	78 (27.0)	15 (27.3)	33 (29.0)	12 (21.1)	8 (57.1)	1 (9.1)	7 (35.0)
North East Asia	3 (1.0)	0 (0.0)	2 (1.8)	1 (1.8)	0 (0.0)	0 (0.0)	0 (0.0)
Oceania	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
North America	5 (1.7)	0 (0.0)	1 (0.9)	0 (0.0)	0 (0.0)	2 (18.2)	2 (10.0)
Central America & Caribbean	12 (4.2)	1 (1.8)	6 (5.3)	3 (5.3)	1 (7.1)	0 (0.0)	0 (0.0)
South America	7 (2.4)	3 (5.5)	2 (1.8)	2 (3.5)	0 (0.0)	0 (0.0)	0 (0.0)
Region Unknown	1 (0.4)	1 (1.8)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Travel Reason, n (%)							
Business	15 (6.3)	3 (5.5)	10 (8.8)	3 (5.3)	0 (0.0)	1 (9.1)	0 (0.0)
Education	6 (2.5)	2 (3.6)	3 (2.6)	2 (3.5)	0 (0.0)	0 (0.0)	0 (0.0)
Migrant Worker	3 (1.3)	0 (0.0)	2 (1.7)	1 (1.8)	0 (0.0)	0 (0.0)	0 (0.0)
Migration	17 (7.1)	1 (1.8)	12 (10.5)	4 (7.0)	0 (0.0)	0 (0.0)	2 (10.0)
Volunteer	22 (9.2)	6 (10.9)	10 (8.8)	3 (5.3)	0 (0.0)	0 (0.0)	2 (10.0)
Planned Medical Care	1 (0.4)	0 (0.0)	0 (0.0)	0 (0.0)	1 (7.1)	0 (0.0)	0 (0.0)
Tourism	144 (60.0)	36 (65.5)	61 (53.5)	38 (66.7)	12 (85.7)	10 (90.9)	13 (65.0)
Visiting Friends or Relatives	32 (13.3)	7 (12.7)	16 (14.0)	6 (10.5)	1 (7.1)	0 (0.0)	3 (15.0)

*Some patients had more than one diagnosis.
**18 diagnoses were defined as Other diagnoses.
% Percent of diagnosis group.

Database. The database contains information about symptoms, travel itinerary, reasons for travelling, pre-travel encounter with a health care provider and vaccination status. Final diagnoses were selected from a list including more than500 pre-defined diagnoses.

Information on pre-travel advice was collected from patient files. Malaria prophylaxis and vaccination prior to travel were regarded as being included in pre-travel advice. Patients with the sole purpose of migration were not included in the calculations concerning pre-travel advice.

This study is approved by the Danish Data Protection Agency, approval number: 1-16-02-675-15.

2.2. Inclusion criteria

We included all patients hospitalized with a travel-related disease at the Department of Infectious Diseases between 1st of January and 31st of December 2015. Travel-related diseases were defined according to GeoSentinel as diseases which in terms of time and characteristics were correlated to an international travel. It refers to patients who have crossed an international border within 10 years and present and are referred to the reporting clinician for a presumed or possible travel-related illness and need hospital admission. Patients diagnosed with a non-travel-related illness were excluded. We included both people from Denmark returning from a travel, people from other countries travelling to Denmark and immigrants who had acquired a disease before leaving their country of origin.

The reason for travel was divided into Business, Education, Migration, Migrant Worker, Planned Medical Care, Tourism, VFR and Volunteer. VFR was defined as “A 1st or 2nd generation immigrant, originally from a lower income country, now living in a higher income country, visiting friends and relatives in the country of the family's origin”. Migrants were defined as patients where migration was the sole purpose of travelling, and where they acquired the disease either in their home country prior to departure or on their way to Denmark. It does not apply to individuals who have moved across borders within Western Europe, Canada/US or Australia/New Zealand. Immigrants who lived in Denmark and travelled as e.g. tourists or VFRs were not included in the Migrant group. Diagnoses were divided into Gastrointestinal diagnoses, Febrile illnesses, Respiratory diagnoses, Dermatological diagnoses, Neurological diagnoses, Genitourinary diagnoses and sexually transmitted diseases (STD) and Other. An illness was defined as a symptom picture, while a disease was defined as a diagnosis with a known etiology.

2.3. Statistical methods

Data from the GeoSentinel Database was analysed using Stata IC 14 (StataCorp, College Station, Texas, USA), using chi-square statistics to assess correlations between the specific diagnoses and travel region, demographic characteristics and reasons for travel. Risk ratios were calculated with 95% confidence intervals (CI). Baseline characteristics in migrants and non-migrants were compared using the chi-square test for categorical variables and the Mann-Whitney *U* test for continuous variables. Median and interquartile ranges (IQRs) were determined for continuous variables.