Prevalence of Chronic Diseases among International Travelers Seeking Pretravel Medical Advice in 2018 at Malaga, Spain

Rosa M. Lopez-Gigosos,^{1,2*} Marina Segura,² Eloisa Mariscal-Lopez,¹ Mario Gutierrez-Bedmar,¹ and Alberto Mariscal¹

¹Department of Public Health and Psychiatry, Faculty of Medicine, University of Malaga, Malaga, Spain; ²International Vaccination Center of Malaga, Maritime Port of Malaga, Ministry of Health, Consumption and Social Welfare, Government of Spain, Malaga, Spain

Abstract. Travelers with preexisting diseases or chronic conditions may be more susceptible to travel-related health risks. They may, therefore, require more attention from specialist travel medicine providers. Our objective was to examine a group of international travelers in Malaga, Spain, quantify the proportion of travelers suffering from chronic conditions, and understand the characteristics of this group. A representative sample of travelers requesting pretravel medical advice at one travel clinic were asked about their preexisting chronic conditions and any immunosuppression. Additional demographic variables were used in an analysis of bivariate correlations. We used a binary logistic regression analysis to identify relationships between independent variables (age, gender, type of trip, travel duration, and destination) and the presence or absence of chronic conditions in travelers. Of the sample of 1,196 travelers, 258 (21.6%) reported having preexisting chronic conditions and 72 (6%) had two or more chronic conditions. Twenty-four of the travelers with chronic conditions (9%) were immunocompromised because of the disease or treatment. The two most common chronic conditions were cardiovascular disease and chronic respiratory conditions (36.8% and 17.1%, respectively). The chronic condition increased by 6.7% for every year of increased age. Travelers with chronic conditions are older, travel mainly to visit friends and relatives, and take shorter trips. More than half of travelers visiting (55.8%) needed more attention from the travel medicine practitioner because of their preexisting chronic conditions, age, or type of travel. Surveillance data based on the population of people traveling would be helpful to provide better advice to travelers.

INTRODUCTION

In 2017, almost 1.4 billion international arrivals (overnight visitors) occurred around the world, and this is expected to increase to almost two billion by 2030.¹ A large proportion of these trips will be made to countries with considerable health risks, so it is likely that the demand for pretravel medical advice will continue to grow.¹

The profile of travelers and destinations are constantly changing. In recent years, there have been advances in medical treatment that have improved quality of life for patients with chronic conditions. At the same time, more trips have become available to secure international destinations, which has increased the number of older travelers or those with preexisting medical conditions. It is common to find travelers of all ages, including children, adolescents, and older people, and many have chronic conditions such as heart disease, diabetes, asthma, or arthritis.^{2–4} These travelers require specialized attention from experts in travel medicine, to check their routine medication, and identify possible interactions with treatments or recommended vaccines for the trip.⁴ Some vaccines, such as live-attenuated vaccines, are contraindicated for some patients, and antimalarial chemoprophylaxis can interact with some medications. It is, therefore, necessary to weigh the risks and benefits before providing recommendations. Noncommunicable diseases are the major causes of disability and death globally, including 70% of all deaths (93% in Spain),⁵ and tend to become more common with age.⁵ The risk of travel-related diseases is more than doubled in people with underlying medical conditions compared with healthy individuals.⁶ Providing travel medicine

advice for patients with chronic conditions requires a personalized plan for vaccines and prophylaxis.

The objective of this study was to identify the proportion of international travelers suffering from chronic conditions in a group of people who sought pretravel medical advice at the International Vaccination Center (IVC) in Malaga and describe their characteristics, including age, gender, duration and type of travel, and destination.

MATERIALS AND METHODS

This was a prospective, observational, and descriptive study of travelers requesting pretravel medical advice at the IVC in Malaga (South of Spain). Participants were recruited prospectively. To estimate a prevalence of chronic conditions of 20% with an absolute precision of $\pm 2.5\%$, 909 participants were required. For the sample size calculation, we used the formula for estimating a proportion on a finite population (12,000 travelers per year) with 95% CI and a design effect of 1. The expected prevalence (20%) was based on a previous pilot study on 30 participants, and the population was inferred according to a previous study.⁷ During the data collection period (3 months), a total of 3,000 travelers were expected. To achieve the required sample size, we used a systematic random sample with a skip interval of 3. In total, 11,402 travelers visited the IVC in 2018. One in every two travelers visiting the IVC between September 1 and November 30, 2018 was randomly selected. Travelers returning for a second or subsequent visit during the study period were excluded. Two medical professionals trained in pretravel consultations conducted face-to-face interviews in Spanish, English, or French to complete a questionnaire in a closed electronic system (SISAEX, Madrid, Spain) during the consultation. The questionnaire included information on age, gender, countries visited, travel duration in days, reason for travel (tourism, business, visiting friends and relatives (VFR), or humanitarian cooperation), presence and type of pre-diagnosed chronic

* Address correspondence to Rosa M. Lopez-Gigosos, Department of Public Health and Psychiatry, Faculty of Medicine, University of Malaga, Boulevard Louis Pasteur, 32 29071-Málaga 29071, Spain. E-mail: roslogigig@uma.es

conditions, and presence and type of immunosuppression. The SISAEX (Foreign Health Information System) is a database management system that collects data on travelers requesting travel-related health information at all IVCs in Spain. Authorization for the handling of the SISAEX data was obtained from the responsible agency at the Spanish Health Ministry. The authors had no access to any identifying personal information. During the face-to-face interview, travelers were informed about the study and asked if they agreed to participate. All travelers expressed their consent for the study and were informed that their data will be used for centralized control procedures and can be used for statistical purposes and health research. For this noninterventive study, no ethics committee approval was required.

Data de-identified were entered anonymously and analyzed using SPSS v25 (SPSS Inc., Chicago, IL). Characteristics of participants were described as means and SD for continuous variables and percentages for categorical variables. Group comparisons were carried out using Student's *t*-test, one-way analysis of variance (ANOVA), or chi-squared test as appropriate. To study the association between chronic conditions and independent variables, we used a multivariate logistic regression model, including potential confounders and those variables that had reached at least a $P < 0.20$ in the bivariate analysis. Variables included in the final model were age (years), gender, Africa destination (binary: yes/no), Southeast destination (binary: yes/no), duration of trip (binary: ≤ 30 days/ > 30 days), and type of trip as VFR (binary: yes/no). All statistical tests were two-sided, and P values < 0.05 were considered statistically significant.

RESULTS

A total of 1,196 travelers (50.3% female) were included in the study, and 10.5% of the total number of travelers (11,402) visited the IVC during 2018. The mean age of the travelers was

38 years (SD = 15.75), and they traveled mainly as tourists ($N = 802$, 67.1%) to countries in WHO Southeast Asia Region ($N = 404$, 33.78%) or the WHO Americas Region ($N = 346$, 28.93%) for between 8 and 30 days ($N = 818$, 68.39%). Overall, 258 travelers (21.6%) had at least one chronic condition. Demographic and travel characteristics of travelers with and without disease or chronic condition are summarized in Table 1.

Travelers aged 65 years or older made more often (83.4%, 95% CI 73.6–90.6) shorter trips (≤ 30 days) than travelers aged less than 65 years (73.5%, 95% CI 70.8–76.5), although these differences were borderline-significant ($P = 0.08$). On the other hand, travelers aged 65 years or older made trips mainly as tourists (85.7%, 95% CI 76.4–92.4 versus 65.5%, 95% CI 62.6–68.3; $P < 0.001$). Two hundred and thirty-six subjects (19.7%) were VFR travelers, of whom 65.3% and 29.3% went to the Americas and Africa, respectively. Of those younger than 16 years ($N = 87$), 62.1% were VFR who traveled to the Americas (72.2%) and Africa (27.8%).

The mean age of travelers with chronic conditions was higher than those who did not report chronic conditions (49.4 years, SD = 16.3 versus 35.9 years, SD = 14.1; $P < 0.001$). The chronic conditions were more frequent in traveler 65 years or older (66.7%, 95% CI 55.5–76.6) compared with those between 46 and 64 years old (37.1%, 95% CI 31.1–43.4) or younger than 45 (12.7%, 95% CI 10.6–15.1) ($P < 0.001$). Comorbidity was also frequent, and 72 of travelers with chronic conditions (27.9%) reported having two (22.1%) and three or more (5.8%) diseases. The mean age of travelers with one, two, and three or more chronic conditions was 46.1 (95% CI 43.7–48.5), 57.4 (95% CI 45.8–68.9), and 60.5 years (95% CI 55.2–65.8) ($P < 0.001$), respectively. There were no significant differences in gender, duration, or type of trip between travelers with and without chronic diseases by bivariate analysis (Table 1). Nevertheless, more men than women (33/23) older than 65 years reported chronic conditions ($P = 0.008$). The proportion of travelers with chronic conditions was

TABLE 1
Chronic conditions and demographic and travel characteristics of travelers

Demographic and travel characteristics	Travelers with disease or chronic condition ($N = 258$) %	Travelers without disease or chronic condition ($N = 938$) %	<i>P</i> -value
Gender			
Male	125 (48.4)	470 (50.1)	0.344
Female	133 (51.6)	468 (49.9)	
Age (years)			
≤ 15	6 (2.3)	81 (8.6)	< 0.001
16–64	196 (76.0)	829 (88.4)	
≥ 65	56 (21.7)	28 (3.0)	
Type of trip			
Tourist	169 (65.5)	633 (67.5)	0.587
Business	20 (7.8)	91 (9.7)	
Cooperation	11 (4.3)	36 (3.8)	
VFR	58 (22.5)	178 (19.0)	
Duration (days)			
< 8	14 (5.4)	55 (5.9)	0.265
8–30	187 (72.5)	631 (67.3)	
> 30	57 (22.1)	252 (26.9)	
WHO region visited*			
Africa	68 (26.4)	206 (22.0)	0.024
Americas	78 (30.2)	268 (28.6)	
Southeast Asia	68 (26.4)	336 (35.8)	
Europe	4 (1.6)	5 (0.5)	
Eastern Mediterranean	7 (2.7)	13 (1.4)	
Western Pacific	33 (12.8)	110 (11.7)	

* Travel destinations grouped into WHO geographical regions.

TABLE 2
Preexisting health conditions among the 258 travelers who reported chronic condition

Clinical conditions	Age (years)		P-value
	< 64 N = 202 (%)	≥ 65 N = 56 (%)	
Chronic disease			< 0.001
Cardiovascular	65 (32.2)	45 (80.4)	
Chronic respiratory	46 (22.8)	2 (3.6)	
Endocrine diseases*	28 (13.9)	7 (12.5)	
Joint pathology	28 (13.9)	12 (21.5)	
Psychiatric pathology	22 (10.9)	10 (17.0)	
Type 1 and 2 diabetes	19 (9.4)	9 (16.1)	
Neurological pathology	18 (8.9)	1 (1.8)	
Cancer	12 (5.9)	0 (0.0)	
Other†	16 (7.9)	2 (3.6)	
Immunocompromised			0.008
Congenital/acquired immunosuppression disease	5 (2.5)	3 (5.4)	
Corticosteroids/cytostatic treatment	11 (5.4)	2 (3.6)	
Monoclonal/polyclonal Ab treatment	2 (1.0)	1 (1.8)	

* Type 1 and 2 diabetes are not included.

† This includes aplastic anemia (1), chronic liver disease (5), chronic renal failure (6), morbid obesity (1), and psoriasis (5).

lower in those visiting Southeast Asia (16.8%, 95% CI 13.3–20.8) and higher among those going to Western Mediterranean (35.0%, 95% CI 15.4–59.2, $P = 0.038$).

The most frequently seen chronic conditions were cardiovascular disease (42.6%) (Table 2). The mean age was higher for travelers with cardiovascular disease (58.3 years, SD = 13.0) and diabetes (54.6 years, SD = 11.0) than chronic respiratory disease (38.8 years, SD = 16.1) or cancer (45.2 years, SD = 14.7).

During the consultation, 24 travelers with chronic conditions also reported that they were immunosuppressed because of a disease or treatment. This was 9.3% of travelers with chronic conditions and 2% of all travelers.

The proportion of travelers immunocompromised by medication and/or disease increased with age, from 1.6% (95% CI 1.0–2.5) for travelers younger than 65 years to 7.1% (95% CI 2.7–14.9) for older travelers ($P < 0.001$). There were no significant differences in the frequency of immunosuppression by gender or in the duration of trip between travelers with and without chronic conditions, but only three of the 24 immunosuppressed travelers made trips of more than 30 days.

A binary logistic regression analysis was used to predict the presence or absence of chronic disease in travelers visiting the IVC, and the relationship with independent variables (age, gender, type of trip, travel duration, and destination). The final model selected included age, gender, a destination in Southeast Asia or Africa, the duration of the trip, and trips to visit friends or relatives (Table 3). The model was significant and 81.8% of the cases were correctly classified. Of the variables introduced in the model, age was a significant predictor ($P < 0.001$). For every year of increased age, the risk of having a chronic condition increased by 6.7%. It could be inferred from the model that travelers with chronic conditions are older, travel mainly as VFR, take shorter trips, and are less likely to visit Southeast Asia.

DISCUSSION

Our study investigated the number of travelers with preexisting medical conditions in a representative sample of

travelers visiting an IVC in southern Spain. The mean age of the traveler (38 years) was 7 years higher than in another study in Spain between 1999 and 2004⁸ but similar (37 years) to that found in more recent studies (2009–2011) in Marseilles and the United States.^{3,9} However, there were some differences when comparing the most frequent travel destinations in the traveling population studied and those found in other cities in Europe and the United States.^{3,9,10} The high number of travelers (42.4%) to Southeast Asia or the Western Pacific reflects an international positive trend previously described in recent years.^{7,11,12} On the other hand, the high number of travelers to the Americas (28.9%), especially to South America, reflects historical and cultural links and language. Almost all travelers to the Americas in this study were going to countries in South or Central America because travelers to Canada or the United States generally do not need specialized travel assistance.

Most travelers were healthy and required a standard pre-trip consultation that includes a brief medical background check, personal risk assessment, the need for vaccination or chemoprophylaxis for malaria, and information about protection against insects, diarrhea, problems with water and food, or altitude.^{13,14} Other travelers, however, require more time in their pre-trip consultations. In this study, we included in this group travelers with chronic diseases (21.6%), VFR travelers (19.7%), people aged 65 years and older (7%), and children

TABLE 3
Binary logistic compliance model

Variables	Odds ratio	95% CI
Age (years)	1.067	1.056–1.078
Gender (male*)	0.839	0.619–1.137
Destination†		
Africa	0.928	0.637–1.352
Southeast Asia	0.648	0.441–0.953
Duration of trip†	0.797	0.544–1.169
Visits to friends and relatives†	1.515	1.011–2.272

Odds ratios and 95% CIs for associations between preexisting health conditions and variables selected.

* Reference category.

† Variables were coded as follows: Africa destination (binary: yes/no), Southeast destination (binary: yes/no), duration of trip (binary: ≤ 30 days/> 30 days), and type of trip as VFR (binary: yes/no).

aged 15 years or younger (7.4%). We found that 42.6% of travelers had special requirements, slightly more than the percentage found by Aubry (36%) or Bühler (35.3%).^{2,3} In our study, the number of VFR travelers was almost 20%, which was higher than that found (8–16.5%) in other studies from the European Union.^{2,3,8} The main travel destinations of VFR (94.6% to America and Africa) usually involve immigrants from South or Central America and Africa, and reflect the high immigrant population from both those regions in Malaga. The reason for the increase could be because of recent improvements in the economic situation because economic crises have clear effects on the number of travelers each year.^{7,15}

As expected, the frequency of chronic conditions among travelers increased with age, ranging from 6.7% in children younger than 16 years to 66.7% in those older than 65 years. These data are similar to those found by Aubry et al.³ in children younger than 16 years, although the number of travelers older than 60 years with chronic conditions was significantly higher in our study than in Marseilles (27%), Zurich (about 40%), or Galway (56%).^{3,16,17} This may be partially because the mean age of the travelers visiting the IVC was higher than in these other studies, and therefore, the proportion with chronic conditions was also greater. Previous studies have found that the mean age of travelers with chronic conditions was 32,¹⁷ 39,⁴ and 47,¹⁸ compared with 49 years in our study. These differences may be explained by the methodology and date of the study or the demographic composition of the populations.

In total, 9.2% of the travelers visiting the IVC and 53.6% of those of 65 years or more had cardiovascular disease. Previous studies have found levels of cardiovascular disease among travelers ranging from 1.8% to 12.8%.^{2,3,17} These differences, as with other chronic conditions included in the study, are the result of local demographic differences in the populations studied and the methodology used in each study. We asked travelers about their chronic conditions using the WHO chronic disease classification,⁵ but other studies have used alternatives that make it difficult to directly compare the results. Factors or conditions known to interact with the most common pretravel prescriptions for malaria, yellow fever, or diarrhea were included in the study by Van de Winkel et al.,⁴ Valim et al.,¹⁹ Bica et al.²⁰ However, Aubry et al.,³ in their prospective study on travelers visiting pretravel medical consultations, collected more detailed information about chronic medical conditions. They excluded pilgrims to Mecca in the Haj and people like the crew of planes and ships.³ In a similar study by Han et al.,¹⁷ common medical conditions were included, including aspects with particular relevance for travel vaccines such as immunosuppression and egg allergies. They included only travelers with a previous medical history and/or those taking prescribed medications for chronic or ongoing diseases.¹⁷

The improvement in life expectancy and treatment of chronic diseases provides opportunities for travel by patients whose immune system has been suppressed by drugs or disease. These travelers, estimated to be between 0.7% and 4% of travelers,^{2,3,10,17} were well represented in our study, with 24 individuals (2% of travelers), and require specialized support from medical experts in travel medicine.^{4,21,22}

This study has provided valuable information about the characteristics of international travelers. However, it is limited by not having access to medical records containing information about chronic conditions, apart from the information obtained by doctors at the IVC during an interview with the traveler.

However, the interviews were carried out by specialist doctors and, therefore, provide more information than a simple questionnaire about medical conditions. Generally, travelers do not refuse to provide detailed information when doctors ask about their medication because they know that some medication may interact with some recommended prophylaxis. This study included only travelers visiting the IVC, so those who did not seek medical advice or consulted other sources such as general practitioners were not included. The period studied was also limited to 3 months, between September and November, so it could have been influenced by seasonal effects. The percentage of travelers with a chronic condition could be lower during common holiday periods in the Northern Hemisphere (July–August), in which younger and healthier travelers can travel. However, our objective was to find the most common chronic conditions among travelers visiting our IVC.

CONCLUSION

Medical consultations for travelers who require special assistance because of a chronic condition, ongoing or planned pregnancy, age (older or very young), and VFR travelers require particular attention to adapt vaccination and pretravel medical advice to this vulnerable population. Our study, like most studies in specialized travel clinics, is not representative of the entire traveling population, but it does represent most travelers traveling to countries where there are specific risks, such as yellow fever, malaria, Zika, Japanese encephalitis, and other tropical diseases. The high number of people with special requirements traveling to high-risk areas means that travel medicine provision requires ongoing training on both to the health status of travelers and the treatments they may be receiving. At the same time, it is also important to train doctors such as pediatricians, geriatricians, internists, general practitioners, and specialist physicians caring for immunocompromised people in travel medicine.

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Authors' addresses: Rosa M. Lopez-Gigosos, Eloisa Mariscal-Lopez, Mario Gutierrez-Bedmar, and Alberto Mariscal, Department of Public Health and Psychiatry, Faculty of Medicine, University of Malaga, Malaga, Spain, E-mails: roslopgig@uma.es, emarisca@uma.es, bedmar@uma.es, and mariscal@uma.es. Marina Segura, International Vaccination Center of Malaga, Maritime Port of Malaga, Ministry of Health, Consumption and Social Welfare, Government of Spain, Malaga, Spain, E-mail: marina.segura@correo.gob.es.

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