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Population-based surveillance of medical tourism among U.S. residents from 11 states and territories: Findings from the Behavioral Risk Factor Surveillance System

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Abstract

Objective: Describe medical tourism among a subset of United States (U.S.) residents; identify possible indicators for medical tourism.

Methods: The U.S. Centers for Disease Control and Prevention collaborated with 11 states and territories to ask six questions about medical tourism, using the Behavioral Risk Factor Surveillance System. Data collected from 1 January 2016 through 31 December 2016 included whether respondents traveled internationally for pre-planned care, travel reasons and destinations, procedures received, and occurrence and treatment of complications. A descriptive analysis of demographics, socioeconomic status and health access variables was performed, and a regression model with a log-link function and Poisson distribution was used to estimate prevalence ratios (PR) for medical tourism.

Results: Of 93,492 respondents, 517 (0.55%) traveled internationally during the previous year for care. Mexico was the most common destination (41% of trips). Dentistry accounted for 55% of treatments. Five percent reported complications from medical care received abroad; 67% sought care upon returning to the United States. The prevalence of medical tourism was 1.32% (95% CI 1.00–1.64). The prevalence of medical tourism was higher in Hispanics and non-whites (PR 3.97 [95% CI 2.48–6.32]) and higher among those without current health insurance (PR 2.70 [95% CI 1.69–4.34]).

Discussion: This is the largest collection of population-based surveillance data describing medical tourism across U.S. residents from multiple states and territories. Understanding the demographic and socioeconomic factors associated with medical tourism can inform evidence-based recommendations for travelers and clinicians who may advise or care for these individuals before, during, or after travel.

INTRODUCTION

Medical tourism, or pre-planned international travel for medical care, has increased in recent years.^{1,2} Growing inequalities in healthcare access, affordability, and quality of care; an increase in available medical and dental procedures at lower costs; and tailored marketing strategies have contributed to a rapidly growing international market.^{3,4,5} In 2018, the estimated annual international market value for medical tourism was \$16.7–36.9 billion.^{6,7}

United States (U.S.) residents may travel internationally for any type of care, such as dental care, cosmetic surgery, orthopedic surgery, and organ and tissue transplantation.^{1,2,8}

Complete and accurate data on medical tourism volume, destinations, procedures, and outcomes are unavailable.² Most literature describes medical tourism as an industry^{6,7,9} and does not focus on its unique health risks. Complications attributed to medical tourism include wound infections, bloodstream infections, donor-derived infections and bloodborne pathogens including hepatitis B, hepatitis C, and HIV.¹ Air travel after recent surgery increases the risk for blood clots, including deep venous thrombosis and pulmonary emboli.¹ The risk of antibiotic-resistant infections may be increased in certain regions, and appear to be more common in some countries where U.S. residents go for medical tourism.² The United States has experienced several outbreaks of highly resistant pathogens in medical tourists returning with complications from care they received abroad^{1,10-12} including the introduction of pathogens not previously seen in the United States.¹³ Previous assessments have described the scope of medical tourism, though interpretation is difficult due to differences in definitions and methodologies.^{3,5,14} Currently, there are no reliable population-based surveillance data describing U.S. medical tourists seeking care internationally including numbers, destinations, types of care received, their reasons for seeking care abroad, and associated negative health outcomes.

The Travelers' Health Branch at the U.S. Centers for Disease Control and Prevention (CDC) collaborated with 10 states and Puerto Rico to add medical tourism questions to the 2016 Behavioral Risk Factor Surveillance Survey (BRFSS). We sought to describe medical tourism among a subset of U.S. residents and identify possible indicators for medical tourism. Identifying medical tourists and factors influencing their decision to engage in medical tourism can inform evidence-based health recommendations for medical tourists and their providers and identify potential targets for public health interventions to support this population.

METHODS

Data source

The BRFSS is a CDC-sponsored, state-based, random-digit-dialed telephone survey that collects information on health-related behaviors, chronic health conditions, and the use of preventive services by non-institutionalized U.S. resident adults 18 years old.¹⁵

In 2015, 11 U.S. states and territories (Arizona, California, Connecticut, Florida, Georgia, Maryland, Massachusetts, Minnesota, Oregon, Puerto Rico, and Texas) added six questions about medical tourism on their 2016 BRFSS surveys (Appendix 1). States and territories were chosen on the basis of their interest in medical tourism and their agreement to include the medical tourism questions on their 2016 BRFSS survey. The first question asked: "During the past 12 months, did you travel outside of the United States to receive pre-planned medical, dental, or surgical procedures or treatments?" If the respondent answered 'yes' they were asked 5 additional questions: destination, type of care received, reasons for traveling for care, if they experienced any undesirable health outcomes as a result of this care, and for those who did experience a problem, if they saw a provider after returning to

the United States. Respondents who answered ‘don’t know’ or ‘refused’ were excluded from analysis of that question. Respondents could report more than one type of care, give more than one reason for traveling for medical tourism, and list up to 3 countries that they visited for medical tourism in the last 12 months. Interviewers wrote in answers if the respondent reported a procedure or reason not listed on the form.

Inclusion and Exclusion Criteria

Respondents who answered ‘yes’ or ‘no’ to the question “During the past 12 months, did you travel outside of the United States to receive pre-planned medical, dental, or surgical procedures or treatments?” were included in the analysis; those who answered ‘yes’ were classified as medical tourists. Those who answered ‘yes’ but only reported travel within the United States or did not receive pre-planned care were excluded.

Data Analysis

We conducted a descriptive analysis of the following core variables from the BRFSS for medical tourists: demographics, socioeconomic status, and health and health access. We used a regression model with a log link function and a Poisson distribution to estimate prevalence ratios (PR) and 95% confidence intervals (CI) for medical tourism for each variable. We weighted data to account for survey design and population characteristics; we used an iterative proportional fitting method to account for selection probability, nonresponse bias, and noncoverage errors.¹⁶

We defined statistical significance as an alpha of 0.05. We calculated the prevalence of medical tourism in the study population with 95% CI. SAS Enterprise Guide v7.1 (SAS Institute, Cary NC) was used for analyses.

RESULTS

Of 93,965 respondents asked if they had traveled outside of the United States to receive pre-planned health care in the last 12 months, 93,492 (99.4%) answered ‘yes’ (n=535) or ‘no’. Those from Puerto Rico who reported the United States as their destination for medical tourism (n=9), and those from U.S. states who indicated Puerto Rico as their destination (n=5) were excluded. Those who did not receive pre-planned care were excluded (n=4). Demographics and health characteristics of respondents can be found in Table 1.

The 517 medical tourists made 705 trips outside of the United States and received 540 treatments, procedures, or surgeries in the 12 months preceding the interview. Dental work accounted for 299 (55%) of the procedures reported, followed by unspecified procedures (108, 20%) (Table 2). Mexico was the most frequently reported destination (291 trips, 41% of all trips) followed by Colombia (45, 6%), and Canada (28, 4%) (Table 3). Medical tourists traveled to all world regions except Antarctica (Appendix 2).

Five-hundred six medical tourists provided 582 reasons for traveling for care. The most frequently reported reason was “too expensive in the United States” (51%), followed by “not covered by insurance” (14%), “more familiar or comfortable receiving the procedure or treatment in another country” (7%), “felt quality of care or success better in another

country” (6%), and “not available in United States” (3%). Of the 297 who reported the procedure was too expensive in the United States, 208 (70%) reported receiving dental work. Of the 89 who received non-dental procedures and reported their procedure was too expensive in the United States, 68 (76%) reported having health insurance.

Of the 517 medical tourists, 24 (5%) reported an unexpected or undesirable outcome as a result of the care they received abroad. Unspecified procedures (n=9), dental work (n=6), and kidney transplants (n=4) were reported most frequently; facial cosmetic surgery, heart transplant, “tummy-tuck” and an unspecified medical treatment for an illness were each reported once among procedures of those experiencing unexpected problems. Twelve (50%) who reported an unexpected problem went to one country only on a single occasion; 5 (21%) went to the same country more than once. Nine (38%) went to more than one country for care for a single reported category of procedure. Reasons for pursuing care abroad among the 24 medical tourists who reported unexpected problems included that the procedure was too expensive in the United States (n=5), it was not available in the United States (n=5), it was not covered by insurance (n=4), they perceived that quality of care or success was better outside the United States (n=3), and felt more familiar or comfortable outside of United States (n=1). Of the five who stated their reason for traveling was because the procedure was not available in the United States, four were kidney transplant recipients, one did not specify. Eighteen (67%) of the 24 medical tourists who reported an unexpected or undesirable outcome saw a healthcare provider after returning to the United States. Fifteen reported having health insurance.

The prevalence of medical tourism in 11 states and territories was 1.32% (95% CI 1.00–1.64) representing approximately 1,130,000 individuals (95% CI 900,000–1,410,000). We found no statistically significant gender or age differences between medical tourists and non-medical tourists (Table 1). The prevalence of medical tourism was higher among Hispanics and non-whites (PR 3.97 [95% CI 2.48–6.32]) and higher among those with less than 4 years of college (PR 1.72 [95% CI 1.14–2.59]). The prevalence of medical tourism was higher among those currently working compared to those who were retired (PR 2.46 [95% CI 1.40–4.29]). Medical tourism was more prevalent among those without current health insurance (PR 2.70 [95% CI 1.69–4.34]) although medical tourism was still prevalent among those with health insurance. Medical tourism was more prevalent among those who indicated that cost prevented them from seeing a doctor for any purpose in the last 12 months compared to those who did not consider cost a barrier (PR 2.39 [95% CI 1.48–3.87]).

DISCUSSION

Our analysis of population-based surveillance data demonstrates the actual annual volume of U.S. outbound medical tourists is likely larger than previous estimates.^{17,18} Medical tourists represent a large and diverse population that can be at risk for complications that require follow-up or emergency care after their return home.^{4,10} Medical tourists presenting with complications from procedures abroad may experience prolonged and expensive clinical courses due to delays in diagnosis and treatment.¹⁰

Our data are consistent with previous studies describing issues relating to cost as significant motivators for medical tourism. Some U.S. health insurance providers and employers have formed alliances with facilities outside of the United States to control costs, but specific plan requirements, deductibles, copays, and non-covered travel-related expenses may still pose challenges.^{1,4} We found medical tourism prevalent among those without insurance, however, medical tourists with insurance also traveled for care. Among medical tourists who sought non-dental care and who reported that the procedure they received abroad was too expensive in the United States, 3/4 had current health insurance. This suggests that the care was either not covered or inadequately covered by insurance. Medical tourists who are uninsured or underinsured may be hesitant to present to U.S. healthcare facilities because of the costs of treatment,¹⁹ or to provide details of their care for fear that follow-up care will not be covered by their insurance.

Medical tourists in our sample traveled to Mexico and Canada frequently, but over half of all visits were to other destinations. While the appeal of less expensive or more convenient care motivates millions to travel internationally, techniques, protocols, training and standards of care vary across countries, and healthcare quality can vary across facilities and providers within countries.^{1,20} Facilities may not maintain provider licensure, track patient outcome data, have rigorous infection control, provide adequate follow-up care, or maintain medical record privacy or security policies.^{1,2} Some organizations have developed quality-of-care standards and established accreditation procedures through procedural assessments on quality and safety with medical tourism, but do not provide data on patient outcomes.^{2,21,22} Medical tourists should be aware that all surgeries (even those done in their home countries) contain some level of risk regardless of the destination where they are performed, and accreditation does not ensure a desirable outcome.¹

U.S. residents may travel for medical care because they feel more comfortable having the procedure performed elsewhere. International travel to visit friends and relatives (VFR) is common among the foreign-born population of the United States.²³ VFRs may be more inclined to engage in medical tourism, and additional research is needed to understand this group and any unique risks regarding medical tourism. While VFRs may choose medical tourism because they feel more comfortable with or trusting of care provided outside of the United States, they may be targeted by advertising tailored towards them, often in their native language, emphasizing the convenience of combining a family visit with medical care, while downplaying risks.³ Clinicians advising VFR travelers pre-travel should ask about plans to receive care outside of the United States. Healthcare providers who work in acute care facilities in the United States, especially in communities with a high foreign-born population should be aware that VFRs may present for emergency care with complications from care received abroad.¹⁰

Medical tourists also travel for treatments that are unavailable or illegal in the United States. “Transplant tourism” is travel for the purpose of receiving an organ or stem cells purchased from an unrelated human donor for transplantation.¹ Several studies have identified medical issues with transplant tourism including high rates of serious post-operative infections including hepatitis B, hepatitis C, HIV and tuberculosis.^{24,25} Clinicians advising medical

tourists, including those planning any kind of transplant surgery should be sure travelers are up-to-date on all routine vaccinations including hepatitis B.¹

The majority of reported procedures received abroad were dental. Access to dental services is a challenge in the United States.^{26,27} Dental insurance is often not included in U.S. health insurance packages or may cover a limited number of procedures. A lack of insurance or high deductibles and copayments result in dental care being a service people frequently skip because of cost.^{4,27} Barriers to care and the growing international market for dental services has driven U.S. residents abroad, particularly to Mexico as our data support. Border towns in Northern Mexico that specialize in dental services draw from a broad catchment area of U.S.-resident clientele.²⁸ VFRs represent a group that may be more inclined to travel for dental tourism. In a recent study of medical and dental tourism among immigrants in the United States, nearly half of Latinos and one quarter of Asians surveyed saw a dentist in a foreign country in the previous 12 months.²⁹ Although dental care was the top procedure received among U.S. residents in our sample, there is a lack of reliable data in the literature on volume, destinations, procedures (e.g. routine care vs major surgery), and outcomes among dental tourists.

Our analysis has limitations. BRFSS information is self-reported, which can result in recall bias, and interviewer or recording errors leading to misclassification bias. Data may not be representative of all medical tourists in the United States, and the locations that participated in the study may have a different proportion of medical tourists than other areas. Although we collected data regarding specific categories of procedures received, they were not comprehensive of all procedures one could receive abroad and did not include specific options for dental or routine care. We were limited by the demographic variables available in the BRFSS and could not collect data on birth country, immigration status, dental insurance, or compare rates of complications from care received inside versus outside of the United States. We could not collect data on whether a medical tourist had family in another country, already knew the clinician to perform the procedure, how long the resident has been living in the United States or whether the medical tourist had insurance at the destination. In the nine instances where medical tourists went to more than one country and reported an unexpected problem, we were unable to identify the country where the unexpected problem occurred.

This report summarizes the largest collection of population-based data describing medical tourism among U.S. residents from multiple states and territories. Medical tourism was prevalent among U.S. residents in the areas we surveyed, especially among those who experience barriers to care in the United States (e.g., ethnic minorities and those without insurance coverage). Countries around the world offer quality medical care. U.S. residents considering medical tourism should consider the procedure, destination, treating provider, facilities where the procedure and recovery will take place, and be aware that advertisers marketing directly to travelers may not include comprehensive details on the qualifications of a facility or provider. Medical tourists should discuss their plans with their existing primary care provider if they have one, and consult a travel medicine specialist for advice tailored to their specific health needs, preferably 4-6 weeks before travel.¹ U.S. clinicians should explicitly ascertain travel history including any medical care received abroad. Additional guidelines and recommendations for prospective medical tourists and clinicians

advising them before and after travel are available on CDC's Travelers' Health website and in the latest version of *CDC Health Information for International Travel*.¹

Data describing the volume, destinations, procedures and outcomes among those who do not travel specifically for medical or dental care but decide while at their destination to get a procedure locally would help inform recommendations designed to avoid adverse events among these international travelers. Future studies should also examine the potential risks between medical tourists who combine vacation packages with medical or dental care, those who organize their travel and surgery through a third party (e.g. a medical concierge or a medical tourism travel agency) and those who plan their trip independently. Dental tourism among U.S. residents in general and dental and medical tourism among VFR and non-VFRs should also be an area of focus for future studies.

As more U.S. residents travel internationally for care, population-based surveillance information describing medical tourists including their travel patterns, motivations, procedures received, and their outcomes will be increasingly valuable. These can inform evidence-based recommendations for best practices for pre-travel guidance and post-travel care for medical tourists, and identify risks associated with medical tourism by location and by treatment or procedure.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1.

Demographic and health characteristics of medical tourists and those who did not travel for medical tourism (n=93,492) ^{*†}

	Traveled for pre-planned medical, dental, or surgical procedures or treatments n (col %)		PR [†] (95% CI)
	Yes (n=517)	No (n=92,972)	
Sex			
Male (n=39,815)	244 (47)	39,571 (43)	0.797 (0.493–1.28)
Female (n=53,674)	273 (53)	53,401 (57)	
Age Group			
<45 years (n=22,979)	155 (30)	22,824 (25)	1.11 (0.559–2.21)
45 to 64 years (n=35,020)	190 (37)	34,830 (38)	1.35 (0.634–2.86)
65+ years (n=35,493)	172 (33)	35,321 (38)	REF
Race/Ethnicity			
Hispanic or non-white (n=25,459)	261 (51)	25,198 (28)	3.97 (2.48–6.32)
White non-Hispanic (n=66,472)	248 (49)	66,224 (72)	
Employment			
Currently working (n=42,681)	252 (49)	42,429 (46)	2.46 (1.40–4.29)
Not currently working (n=18,674)	118 (23)	18,556 (20)	2.20 (1.24–3.89)
Retired (n=31,404)	141 (28)	31,263 (34)	
Education			
< 4 years of college (n=57,988)	312 (61)	57,676 (62)	1.72 (1.14 –2.59)
4 years of college (n=35,177)	203 (39)	34,974 (38)	
Income			
< \$75,000 (n=52,937)	339 (77)	52,598 (68)	1.72 (0.750–3.94)
\$75,000 (n=24,574)	101 (23)	24,473 (32)	
Marital Status			
Married (n=47,632)	290 (56)	47,342 (51)	1.24 (0.775–1.97)
Not Married (n=45,211)	225 (44)	44,986 (49)	
Children living in household			
Yes (n=21,998)	134 (26)	21,864 (24)	0.974 (0.586–1.62)
No (n=70,861)	378 (74)	70,483 (76)	
Health characteristics			
Current health plan			
No (n=7,208)	104 (20)	7,104 (8)	2.70 (1.69–4.34)
Yes (n=85,925)	409 (80)	85,516 (92)	
Needed to see doctor in last 12 months but could not because of cost			
Yes (n=9,975)	118 (23)	9,857 (11)	2.39 (1.48–3.87)
No (n=83,249)	396 (77)	82,853 (89)	

	Traveled for pre-planned medical, dental, or surgical procedures or treatments n (col %)		
	Yes (n=517)	No (n=92,972)	PR [†] (95% CI)
Perceived health status			
Good or better health (n=74,432)	398 (77)	74,034 (80)	0.523 (0.307–0.915)
Fair or poorer health (n=18,812)	118 (23)	18,694 (20)	

* Race/Ethnicity missing for 8 (1%) respondents; Education missing for 2 (<1%) respondents; Employment missing for 6 (1%) respondents; Income missing for 77 (14%) respondents; Marital status missing for 2 (<1%) respondents; Children missing for 5 (1%) respondents; Current health plan missing for 4 (1%) respondents; cost barrier missing for 3 (<1%) respondents; perceived health status missing for 1 (<1%) respondent

[†] Prevalence Ratio

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Table 2.

Procedures and treatments received by medical tourists, by type of procedure, BRFSS 2016 (n=540 procedures) ^{aβ*}

	n (%)
Dental work [*]	299 (55)
Unspecified procedure	108 (20)
Medical treatment for illness ^δ	35 (6)
Cosmetic surgery	18 (3)
Organ transplant	10 (2)
Orthopedic surgery	9 (2)
Medical checkup	6 (1)
Other procedure ^θ	6 (1)
Stem Cell transplant	4 (1)
Cardiac/Heart surgery	2 (<1)
Bariatric/Obesity surgery	1(<1)

^a Respondents could list more than one procedure or treatment

^β Don't Know (n=21, 4%); Refused (n=21, 4%)

^{*} Includes any reported dental surgery, treatment, or procedure

^δ 13 respondents specified the treatment or the medical condition they received treatment for: cancer (n=2), infertility (n=2), asthma (n=1), depression (n=1), diabetes (n=1), eye allergy (n=1), influenza (n=1), hormonal (n=1), homeopathic (n=1), physical therapy (n=1), hand therapy

^θ (n=1), ENT specialist (n=1), leg exam (n=1), mammogram (n=1), cancer screening (n=1), pap test (n=1), clinical analysis (n=1)

Table 3.

Top 10 most frequently reported countries for medical tourism (n=705 trips) *

	n (%)
Mexico	291 (41)
Colombia	45 (6)
Canada	28 (4)
Costa Rica	21 (3)
Dominican Republic	13 (2)
Ecuador	13 (2)
Germany	12 (2)
India	10 (1)
Nicaragua	10 (1)
Peru	10 (1)

* Refused to name country (n=30, 4%); Other unspecified destination outside the United States (n=22, 3%); Don't Know (n=19, 3%)

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