Department of Medicine

A Quality Improvement Initiative Using a Novel Travel Survey to Promote Patient-Centered Counseling

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ORIGINAL ARTICLE

A Quality Improvement Initiative Using a Novel Travel Survey to Promote Patient-Centered Counseling

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Running Title: Quality Improvement Travel Survey

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Abstract

Background. We sought to evaluate and better provide itinerary-specific care to pre-counseled travelers by surveying a community population to assess diseases occurring during travel abroad. An additional quality improvement initiative was to expand our post-travel survey to be a more valuable tool in gathering high-quality quantitative data.

Methods. From de-identified data collected via post-travel surveys, we identified a cohort of 525 patients for a retrospective observational analysis. We analyzed illness encountered while abroad, medication use, and whether a physician was consulted. We also examined itinerary variables, including continents and countries visited.

Results. Of 525 post-travel surveys collected, the majority of respondents traveled to Asia (31%), or Africa (30%). The mean number of travel days was 21.3 (median, 14). Univariate analysis demonstrated a statistically significant increase of risk for general illness when comparing travel duration of less than 14 days to greater than 14 days (11.3% vs. 27.7%, p<0.001). Duration of travel was also significant with regard to development of traveler's diarrhea (TD) (p=0.0015). Destination of travel and development of traveler's diarrhea trended toward significance. Serious illness requiring a physician visit was infrequent, as were vaccine-related complications.

Conclusion. Despite pre-travel counseling, traveler's diarrhea was the most common illness in our cohort; expanded prevention strategies will be necessary to lower the impact that diarrheal illness has on generally healthy travelers. Overall rates of illness did not vary by destination; however, there was a strong association between duration of travel duration and likelihood of illness. To further identify specific variables contributing

to travel-related disease, including patient co-morbidities, reason for travel, and accommodations, the post-travel survey has been modified and expanded. A limitation of this study was the low survey response rate (18%); to improve the return rate, we plan to implement supplemental modalities including email and a web-based database.

In 2011, as reported by the World Tourism Organization, 980 million travelers crossed an international border. This number contrasts with 675 million international departures of only 10 years ago.[1] Due to this explosive increase in international travel, the practice of travel medicine continues to grow. Currently, there are 625 travel clinics providing pre-travel medical care and counseling in the United States, as compiled by the International Society of Travel Medicine.[2] As recently reported by the Global TravEpiNet, up to 59% of selected travelers have an underlying medical condition and many immunocompromised patients are traveling to developing countries.[3] Previous studies have documented that 20-64% of international travelers will develop some health problem while abroad.[4]

We set out to perform a retrospective, observational analysis of three years of post-travel survey data to determine associations between travel-related illness and unique features of the travel itinerary, along with other specific demographic variables. We hypothesized that we would be better able to define high-risk travel destinations, determine predictors, and develop a more meaningful survey tool to monitor the quality of itinerary-specific care delivered in the clinic.

Methods

Our travel medicine clinic is best described as a medium-size practice incorporated into a large Infectious Diseases practice. We are located in the third largest catchment in Pennsylvania. For 14 years, we have been collecting post-travel survey data for purposes of quality control and process improvement. Each year, we see more than

500 individuals, including those travelling in large group trips, for pre-travel medical care and counseling. The number of visits has been increasing by about 10% per year for the past three years.

The travel medicine database and survey tool used in the study were approved by our network's institutional review board. We mailed one-page surveys (Appendix 1) to all previously counseled travelers within one month after their planned departure date, with instructions to complete and mail back the surveys upon their return. No repeat mailings or other reminders were sent. Travelers were queried if they became ill, what symptoms they experienced, and if they sought medical help (arbitrarily defined as a serious illness). We also obtained information about their diagnoses and the medications prescribed. If travelers developed diarrhea, they were asked to record the type of medication that they used for treatment.

Data gathered from all surveys returned over a 14-year period were entered into a de-identified database, from which we identified a retrospective cohort of 525 individuals who were seen in the travel clinic from May 2007 through December 2010. From this cohort, simple percentages were calculated for rates of illness by category (gastrointestinal, respiratory, etc) and also rates of illness based on continent destination. We then compared the travel-specific itinerary and demographics, including age of traveler, lag time from pre-travel visit to travel, the destination (by continent), and duration of travel related to the likelihood of illness, travel-related gastrointestinal illness (usually diarrhea), and the likelihood of seeing a medical care provider. Statistical analysis included Chi-square tests for categorical variables and independent t-tests for continuous variables. Each variable distribution was tested for normality. If assumptions

for the parametric tests were not met, non-parametric equivalents were employed, including Wilcoxin Rank Sum and Fischer's Exact Tests.

We examined the data from a quality improvement perspective: deficiencies that were noted in the data tabulation were identified and, from these, a repeat survey tool was created. We plan to test this new, improved survey tool in the future by combining the information in the current database with an expanded version.

Results

Data collection demonstrated an 18% return rate of the survey over the collection period. Of travelers who returned the survey, 31% had traveled to Asia, 30% went to Africa, 20% to South America, and 14% to Central America. Of all travelers, 3.6% went to high-income destinations in Europe and Australia and 1.4% traveled to multiple continents.

Illness was reported in 104 (19.8%) of the cohort. The most common illnesses were gastrointestinal related, reported by 75 (14.3%) of all travelers (Figure 1).

Gastrointestinal illness accounted for 76% of all reported illness. The majority of the gastrointestinal cases were diarrheal disease, although nausea and vomiting were also commonly reported. Respiratory illness, accounting for 14% of all illness reported, was the next most common, occurring in 17 (3.4%) of all respondents. Systemic illness, skin disorders, and "other" illness made up the remainder of the reported illness (Figure 1). Of those travelers who reported illness during travel, 30 sought medical attention (29.4% of ill respondents).

The destinations with the highest risk of reported illness were South America (27.3% of all respondents); Asia, including India, (21.5%); and Africa with 17.4% (Table 1). There was no difference in the rates of self-reported illness among travelers to Africa, Asia, South America, and Central America (p=0.37). Serious illness (defined as illness requiring medical attention) occurred in 8.1% of travelers to South America, 5.7% of travelers to Asia, 5.2% of travelers to Central America and 4.3% of travelers to Africa. Both general illness and serious illness were rarely reported among travelers to developed countries in Europe and Australia.

Gastrointestinal illness, particularly traveler's diarrhea, was the most common affliction. Despite receiving pre-travel counseling, a significant portion of travelers to developing regions reported diarrhea. Rates exceeded 25% in Africa and South America: 26.9% and 28.3%, respectively (Table 1). Rates of traveler's diarrhea were slightly lower in Asia at 20.2%. The differences in traveler's diarrhea rates between these continents were not significant (p=0.30).

The duration of travel was found to be a significant risk factor for acquiring illness abroad. We stratified our responses into quartiles regarding durations of travel (Figure 2). Of travelers going abroad for less than two weeks, only 11.6% (27/232) developed any degree of illness, whereas 40.0% (18/45) of travelers staying abroad longer than 6 weeks reported illness (p=<0.001, for travel >6wks). The prevalence of traveler's diarrhea was also highly associated with duration of travel: 19.6% of short-term (2 weeks or less) travelers developed diarrhea, versus 29.8% of longer-term (greater than 2 weeks) travelers (p=0.024).

We found no difference in the overall rates of illness for vaccinated travelers versus non-vaccinated travelers, although 91% of travelers received pre-travel vaccination. The study was not powered or designed to assess vaccine efficacy in the prevention of overall illness.

The travel cohort was divided into quartiles based on the interval from their travel visit until their departure (1-2 wks, 2-4 wks, 4-6 wks, and >6wks). There was no statistical difference noted between the quartiles regarding the lead time from clinic visit to departure and the relative rates of illness.

Qualitative response data, such as the usefulness of the pre-travel visit and counseling was also evaluated. Respondents were asked to rate the quality of pre-travel advice given to them on a 4-point scale from "none of it helpful" (=1) to "all of it helpful" (=4); of the responders, 92.2% found "most" or "all" of the travel advice to be helpful.

Discussion

Results of our retrospective survey analysis reveal that high rates of self-reported illness in returning travelers remain a significant issue. The overall rate of illness in travelers to developing countries destinations averaged 20% among our convenience cohort, regardless of the continent visited. A comprehensive review by Steffen[5] of prior studies reported a historic rate of up to 77% for general illness occurring in travelers to developing countries. Although illness rates in our study were lower than in the Steffen review, and lower than in several other cohort studies,[6-9] they still are relatively high considering that all of these individuals sought pre-travel counseling. In contrast to

previously published survey studies, we did not find statistically different illness rates among our travelers going to Asia, Africa, Central America, and South America.[6,7]

The most striking finding was a strong association between the duration of travel and the incidence of general illness and severe illness as defined above. Long-term travelers (in our study we defined long term as greater than 4 weeks) had more than twice the rates of illness and traveler's diarrhea than did our short-term travelers (Figure 2). These illness rates are comparable to an earlier travel survey study of Swedish travelers, which showed a significant correlation (OR=3.2) between illness and travel duration of greater than four weeks.[9] Similarly, a study by Winer and Alkan also noted a significant effect of trip duration on likelihood of illness, although the mean duration of travel in their population was much longer at 14.7 weeks.[10] In addition, DR Hill's study on health problems in American travelers demonstrated a 3 to 4% increased risk of developing illness with each additional day of travel.[7]

It is interesting to note that, in our study, rates of diarrhea exceed the rates of reported illness in some destinations. Our observation was that travelers often reported diarrhea, but did not always consider it to be an "illness."

Being that gastrointestinal illness accounts for the majority (76%) of all illness reported in our study, it is clear that emphasizing the heightened risk of illness associated with long travel may be necessary to counter the increased morbidity rates. The relatively high rates of traveler's diarrhea are somewhat disappointing given our emphasis on prevention and management of this ailment at the pre-travel visit. Fortunately, the availability of standby antibiotic treatment may have helped to minimize the impact of this illness on our travel group. An alternate option that might better manage these high

diarrheal rates is the use of prophylactic non-absorbable antibiotics, as was shown effective in a randomized, double-blind study of US students travelling to Mexico.[11]

Interestingly, the interval from pre-travel assessment to trip departure was not associated with the rates of illness or traveler's diarrhea, despite strong recommendations to be seen at least 4-6 weeks prior to departure. It should be noted that this study was not powered to determine if too short of an interval prior to departure would result in increased illness rates, particularly with regard to vaccine preventable diseases. It is reassuring to know that even "late" pre-travel assessments may be of benefit to the traveler.

Almost 30% of all ill travelers in this cohort did seek medical attention—a finding that did not vary by destination continent. This number is much higher than those previously reported by Steffen[5] and Rack,[6] at rates of about 10% and 16%, respectively. Our rate was closer to that of a large cohort study of Swiss travelers, which demonstrated relatively high rates of physician consultation and incapacitation among those who were ill.[8] Despite our designation of serious illness, however, none of our travelers required prolonged hospitalization and none died. As was reported in a recent cohort study of French travelers to Senegal, some more serious illnesses, often with longer incubation periods, may not be captured by the single-center cohort study design.[12]

Our study results were comparable to those in a study Caumes et al, also conducted in the community setting, which revealed similar illness distribution patterns.[13] Single-center cohort studies such as ours are among the most common type of travel medicine research study design. One advantage of this study approach is the ability to capture pre-travel demographic and itinerary data, which can then be compared to post-

travel illness rates to determine relative disease risks for each destination. However, single-center cohort studies are often limited to reporting their results by syndromic diagnoses, rather than by specific disease entities, due to limited numbers of travelers.[14]

Other epidemiologic approaches in travel medicine research, such as large surveillance network studies, offer the potential for more specific disease diagnoses. In addition, larger surveillance studies allow for other types of data analysis such as proportionate morbidities and assessment of disease trends over time.[14] A drawback of these surveillance studies, however, is the inability to calculate specific disease rates for a defined geographic region.

Limitations of our study include the retrospective aspect of this survey tool, potentially leading to recall bias. As a counteractive measure, we mailed surveys during the month of our patients' travel; in many cases the surveys had already been delivered by the time the travelers returned home. Another limitation was the subjective nature of the survey tool, which made it difficult to categorize illness into the discrete disease entities. In addition, the low overall survey response may preclude one from generalizing our results to a larger travel population. In the cohort study of American travelers by Hill, follow-up phone interviews were conducted with those who reported illness as well as with survey non-responders.[7] This strategy might be helpful to maximize survey response rates and also to potentially minimize the effects of recall bias.

As our initial focus was on the most common travel ailments for which our patients were pre-counseled, the original survey did not include questions regarding type of travel (e.g. business or tourism), nor did we ask about pre-existing conditions. Based

on the limitations of our cohort study, implementation of a modified survey (Appendix 2) should better capture post-travel illness data.

Conclusion

Our survey tool has demonstrated value as a novel method for quality improvement in this travel medicine clinic, and has captured travel-related variables useful for defining predictors of acquiring illness in travel abroad. Future directions for our clinic will incorporate the development of additional survey modalities, including a web-based survey to improve response rates and adoption of the method used by Hill in delivering surveys prior to departure[7] so that participants can log their illnesses in "real time" while traveling. We recommend that other clinics use a similar survey process to promote improved patient-centered counseling during the pre-travel encounter.

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Table 1   Traveler Characteristics

Destination	Number of Travelers	Travelers Reporting Illness	Travelers' Diarrhea*
Asia	117	25 (21%)	25 (21%)
S. America	99	27 (27%)	28 (28%)
Africa	161	28 (17%)	43 (27%)
Europe	13	0 (0%)	0 (0%)
C. America	74	12 (16%)	13 (18%)
Australia	5	0 (0%)	0 (0%)
India	46	10 (22%)	8 (17%)
Multiple Continents	10	2 (20%)	3 (30%)
Total	525	104 (20%)	120 (23%)

*Some travelers did not report TD as "illness"

Appendix 1   Original Survey

POST-TRAVEL SURVEY

Thank you for choosing our travel clinic for your pre-travel consultation and immunizations. We greatly appreciate your time and energy in completing this questionnaire. Information provided below will help us improve all aspects of our travel medicine service. Answers to the following questions will be used in building a research database to optimize travel disease prevention. Information provided will be kept confidential. **Please print clearly and legibly**.

General Information:
1. Which country did you travel to? _____
2. How long was your total trip? _____
3. How many individuals did you travel with? _____

Illness:
1. Did you become ill during your trip?   Yes   No
2. What were the main symptoms? _____
3. Did you seek help from a local physician?   Yes   No
   a. What diagnosis were you given? _____
   b. Were you given any medications?   Yes _____   No

Diarrhea:
1. Did you take any preventative medication for "Traveler's Diarrhea" If yes, what did you take?   Yes _____   No
2. Did you develop diarrhea during your trip?   Yes   No
3. What did you take for it? _____
4. How long did it last?   1-2 days   3-4 days   5 + days

Insects & Mosquitoes:
1. Did you notice a lot of mosquitoes?   Yes   No
2. Where were they the most numerous? _____
3. Did you get a lot of bites?   Yes   No
4. Which repellent did you use (brand name)? _____
5. Do you think it worked well?   Yes   No

Vaccines:
1. Did you receive vaccines for this trip?   Yes   No
2. Did you have any problems with the vaccines?   Yes   No
      Which vaccine(s)? _____

Relevance of Advice:
1. Did the advice you received seem appropriate to your needs?
   All of it   Most all of it   Some of it   None
2. Were any items not covered that you think should have been?
   _____

3. Any other comments or suggestions?

_____
_____

Once again we thank you very much for your time and effort with these questions! Please return your post travel survey in the envelope provided.

Name: _____ Date of trip: _____

Please print clearly and legibly.

Appendix 2 Updated Survey

Travel Medicine Clinic Post-travel Survey

Name (optional) :_____ Age:_____ Sex:_____

1. Which continent(s) did you visit during your travel?
    ☐ Asia   ☐ South America   ☐ Africa   ☐ Europe
    ☐ North and Central America   ☐ Australia   ☐ India
    Which specific countries did you visit? _____

2. How long was your total trip (days)? _____

3. Primary reason for travel: ☐ Tourism   ☐ Business   ☐ Volunteer/Mission
    ☐ Visit Relatives/Friends   ☐ Adoption   ☐ Other_____

4. Did you become ill during your trip? ☐ Yes   ☐ No
    If Yes, what were the primary Symptoms?
        ☐ Gastrointestinal (Nausea, Vomiting, Abdominal Pain, Diarrhea)
        ☐ Respiratory (Cough, Congestion, Cold, Pneumonia, Asthma)
        ☐ Cutaneous (Rashes)
        ☐ Systemic (Fevers, Chills, Headache, etc.) Please Specify_____

5. Did you seek help from a local physician or hospital? ☐ Yes   ☐ No
    If Yes, what diagnosis were you given? _____
    Did you receive any medication? ☐ Yes   ☐ No
        If Yes, please specify: _____

6. Did you take any Antibiotics to treat Traveler's Diarrhea (TD)?
        ☐ Yes   ☐ No
    If yes, which one(s)? ☐ Cipro (Ciprofloxacin)   ☐ Zithromax (Azithromycin)
                ☐ Xifaxan (Rifaximin)   ☐ Other: _____

7. Did you develop TD during your trip (3 or more unformed stools in a period of 24
        hours or any unformed stools with Nausea, Abdominal Pain, Fever, Cramps)?
        ☐ Yes   ☐ No
    If yes, how long did it last?   ☐ 1-2 Days   ☐ 3-4 Days   ☐ 5 or more Days

8. Which vaccines (if any) did you receive for this trip?
☐ Yellow Fever   ☐ Hepatitis A   ☐ Hepatitis B   ☐ Tetanus-Diptheria
☐ Typhoid   ☐ Polio   ☐ Meningococcus   ☐ Other: _____

9. Did you have any side effects from the vaccinations?   ☐ Yes   ☐ No
        If yes, please explain side effects: _____

10. Do you have any of the following medical conditions? ☐ Diabetes   ☐COPD
        ☐ Coronary Disease/Congestive Heart Failure   ☐ Cancer

11. On a scale of 1-10, please rate your satisfaction with your travel visit with our travel
        medicine clinic (1 = Extremely Unsatisfied; 10 = Extremely Satisfied): _____

12. In what ways can we improve the visit for future travelers?
_____

Figure legends

Figure 1: Classification of Illness

Figure 2: Percentage of Travelers Developing Traveler's Diarrhea by Duration of Travel
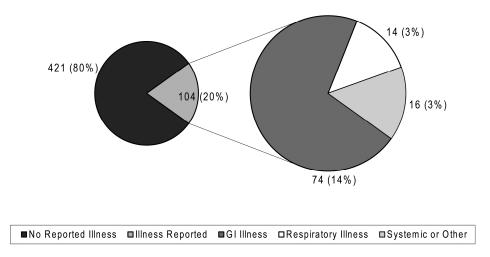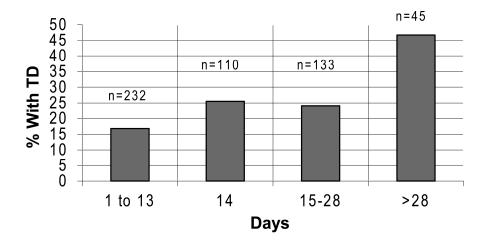
(n = total travelers per time interval)

421 (80%)

104 (20%)

14 (3%)

16 (3%)

74 (14%)

■No Reported Illness ▨Illness Reported ■GI Illness □Respiratory Illness ▨Systemic or Other

Figure 1

Figure 2