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A Comparison of Pharmacist Travel-health Specialists' vs. Primary Care Providers' Recommendations for Travel-related Medications, Vaccinations and Patient Compliance in a College Health Setting

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Abstract

Background: The need for skilled pre-travel health practitioners increases as the number of travelers at risk for travel-related illness rises. Few publications describe the role of pharmacists as travel medicine clinicians. Pre-travel medication and vaccination recommendations and receipt were compared between primary care providers without special training and clinical pharmacists specializing in pre-travel health.

Methods: This was a retrospective chart review comparison of patients seen for pre-travel health services in a pharmacist-run travel clinic (PTC) and by primary care providers (PCP) in 2007 at a university student health center. Vaccine and medication recommendations were assessed for consistency with national and international guidelines. Medical and pharmacy records were queried to determine receipt of vaccines and medications.

Results: The 341 patients seen in PTC were more often recommended antibiotics for travelers' diarrhea when indicated (96% vs. 50%, $P < 0.0001$) than the 172 seen by the PCPs and were also more likely to receive their medication (75% vs. 63%, $P = 0.04$). Those seen by a PCP were more frequently prescribed antibiotics for travelers' diarrhea that were not consistent with guidelines (not ordered when indicated 49% vs 6%, $P < 0.0001$ and ordered when not indicated 21% vs. 3%, $P < 0.0001$). Patients seen in the PTC were more often prescribed antimalarials when indicated (98% vs. 81%, $P < 0.0001$), and those seen by a PCP were more frequently prescribed antimalarials that were not consistent with guidelines (not ordered when indicated 15% vs 1%, $P < 0.0001$ and ordered when not indicated 19% vs. 2%, $P < 0.0001$). Patients seen in the PTC were ordered more vaccines per patient when indicated (mean = 2.77 vs 2.31, $P = 0.0012$), and were also more likely to receive more vaccines when ordered (mean = 2.38 vs. 1.95, $P = 0.0039$). The PCPs recommended more vaccines that were not consistent with guidelines per patient (not ordered when indicated: mean = 0.78 vs 0.12, $P < 0.0001$, ordered when not indicated: mean 0.18 vs. 0.025, $P < 0.0001$).

Conclusions: A pharmacist-run pre-travel health clinic can provide consistent evidence-based care and improve patient compliance compared to primary care providers without special training. Pre-travel health is a dynamic and specialized field that requires adequate time, resources, and expertise to deliver the best possible care.

Background

Over the past few decades, the number of international tourists has grown from 457 million in 1990 to 880 million in 2009, and is estimated to reach 1.6 billion by 2020, with an increasing proportion visiting the developing world. [1] Approximately 8 percent of travelers to the developing world will require medical care during or after travel [2], most often for vaccine preventable diseases and/or illnesses preventable by chemoprophylaxis and behavioral measures.[3-4] With the rapidly increasing number of travelers at high risk for travel-related illness, there is an increased need for highly skilled travel medicine practitioners.

Despite common misperceptions, a thorough pre-travel consultation encompasses much more than administration of vaccines. It is a comprehensive session that includes risk assessment of travelers on their personal risk for travel-related illnesses; recommendation of non-prescription products and travel-related equipment; counseling on behavioral measures such as basic food/water and insect precautions; prescription medications; administration of routine, recommended, and required vaccinations; provision of written educational materials, and counseling on personal safety and security.[5-11] Unfortunately, not all travelers seek or receive this type of comprehensive consultation prior to departure, as a result there is a significant lack of knowledge and perception of risk regarding travel-related health issues among travelers themselves.[12-16]

A 2003 New York airport survey serves as an example. In this study most travelers surveyed were going to places where Hepatitis A was a risk, but only 14% had received the vaccine. Furthermore, 27% of those who were going to high risk malaria regions thought they were not at risk, and only 46% had antimalarials with them. Of the travelers who had antimalarials, 42 % were carrying the medication chloroquine to areas with chloroquine-resistant *plasmodium falciparum.* [14] Recently, the CDC reported that there were 508 U.S. civilians who acquired malaria abroad and for those whom chemoprophylaxis information was known (n=480), 71% reported they did not take a chemoprophylactic regimen recommended by the CDC. [17]

While there is a deficiency in knowledge and compliance with recommendations among travelers, there is also a need for improvement in education and training among health care providers. [14-15, 18-23] Travel medicine is a dynamic specialty that necessitates advanced education and training, as well as keeping up-to-date with current geographic risks. [11, 24] Primary care providers are frequently called upon to provide pre-travel advice and recommendations, but may lack sufficient knowledge, training, and time to adequately provide such services. [13, 18, 21-22] In recent years, organizations such as the International Society of Travel Medicine and the American Society of Tropical Medicine and Hygiene have taken major steps to further education and training among health care providers and to advance travel medicine as a growing specialty.[24]

There are very few publications describing the role of pharmacists in travel medicine. Descriptive studies of clinical pharmacy travel medicine services exist, [25-27] and the few studies that have evaluated the quality of travel recommendations of pharmacists have focused on the community pharmacy setting. [28-31] To our knowledge, there are no published studies evaluating the pre-travel health care of primary care providers in a student health setting and no studies comparing the quality of the pre-travel recommendations of primary care providers without special training versus clinical pharmacists who specialize in pre-travel health.

The setting for this study is a student health center at a major university. The clinical pharmacists at the study setting operate a pre-travel health clinic at the Student Health Center, which serves roughly 30,000 students, and have prescriptive authority for vaccines and medications under physician protocol. The objectives of this study are to compare the recommendations for travel-related medications and vaccinations of the primary care providers and the pharmacists specializing in pre-travel health, and also compare medication and vaccination compliance between the two groups.

Methods

This was a retrospective comparison of all patients seen by a clinical pharmacist in a pharmacist-run travel clinic (PTC) or by a primary care provider (PCP) for international travel over a 1 year period in 2007 at a university student health center. The PCPs included physicians, physician assistants and nurse practitioners. Data was obtained from an internal quality assurance study and included information regarding itinerary, pediatric and adult vaccination history, medical history, and recommendation and receipt of medications and vaccines during each visit. Study subjects were college students 18 years or older who self-referred for a travel consultation.

The PTC providers spent approximately 5 to 10 minutes per patient researching destination risks prior to the visit and had a practice limited solely to pre-travel health. In addition, the pharmacist providers had post-doctoral residency training that included travel medicine and all possessed the Certificate of Knowledge in Travel Health® (CTH®) from the International Society of Travel Medicine (ISTM). Visits in the pharmacist-run travel clinic are structured to include thorough verbal counseling, printed patient education as well as provision of necessary pre-travel medications and vaccines. In comparison, none of the PCPs had a specialty practice or special training in travel medicine, nor were they required to complete such training for their clinical practice. Pharmacists and PCPs had access to the same travel medicine electronic resources.

The decision to go to the PTC or a PCP was based on appointment availability and scheduling preference of the student, and both the PTC and the PCPs had 30 minute appointments. During the quality assurance process, vaccine and medication recommendations were assessed for consistency with recommendations and guidelines from the Centers for Disease Control and Prevention (CDC). Where CDC guidelines were unclear, the World Health Organization and Travax® Encompass (Shoreland, Inc.) were consulted as secondary sources. Medical and pharmacy records were queried to determine if students received recommended medications and vaccines prior to travel. Prescriptions and vaccinations that were documented as refused/declined by the patient were excluded from the analyses of receipt rates. All vaccines were administered by nurses in the immunization clinic and all medications were dispensed from the campus pharmacy. IRB approval was obtained prior to initiating the study.

Basic characteristics of the travelers and the frequencies (or the average numbers) of the pre-travel recommendations between the PTC and the PCP groups were compared by using Chi-square test (or Fisher's exact test) for categorical variables, and two sample T-test or Wilcoxon-Mann-Whitney Test (Non-parametric version of independent samples T-test) for continuous variables, if the normality assumptions underlying the T-test were violated. The primary outcomes for vaccines and medications were 1) indicated and ordered, 2) indicated and not ordered (excluding refused/declined), 3) not indicated and ordered, 4) and ordered and received (excluding refused/declined). The univariate and multivariate logistic regressions (results not shown in tables) were performed to help rate the findings according to their importance as risk/protective factors. All variables that showed the association with the pre-travel recommendations in the univariate models having P values below 0.10 were entered into the more comprehensive multiple logistic regression models, which included visit type (PTC or

PCP), trip duration, purposes of travel (for school activities and being volunteer), and destination (Southeast Asia). All statistical significance was assessed using an alpha level of 0.05. Statistical analysis was performed using SAS 9.2.+

Results

In 2007, 513 travelers were identified, 172 were seen by a PCP and 341 were seen in the PTC. Travelers who were seen in the PTC were more often prescribed antibiotics for self-treatment of travelers' diarrhea when indicated (96% vs. 50%, $P < 0.0001$), while travelers seen by a PCP were more likely to be prescribed antibiotics not consistent with guidelines (not ordered when indicated 49% vs 6%, $P < 0.0001$ and ordered when not indicated 21% vs. 3%, $P < 0.0001$) (Table 2). Furthermore, patients who were seen in the PTC were more likely to pick up their medication from the pharmacy than those who were prescribed antibiotics by a PCP (75% vs. 63%, $P = 0.04$). Travelers seen in the PTC were also more often prescribed antimalarials when indicated (98% vs. 81%, $P < 0.0001$), while those seen by a PCP were more frequently prescribed antimalarials not consistent with guidelines (not ordered when indicated 15% vs 1%, $P < 0.0001$ and ordered when not indicated 19% vs. 2%, $P < 0.0001$). There was no statistically significant difference in antimalarial pick-up rates from the pharmacy between the two groups (Table 2).

Results regarding the ordering and receipt of vaccines were similar to those of antibiotics and antimalarials. To account for multiple vaccines ordered at the same time, the number of vaccines per patient was calculated and used for comparison purposes. Patients seen in the PTC were ordered more vaccines per patient when indicated (mean = 2.77 vs 2.31, $P = 0.0012$), and per patient were also more likely to receive vaccines when ordered (mean = 2.38 vs. 1.95, $P = 0.0039$). The PCPs recommended more vaccines that were not consistent with guidelines per patient (not ordered when indicated: mean = 0.78 vs 0.12, P < 0.0001, ordered when not indicated: mean 0.18 vs. 0.025, P < 0.0001 (Table 3).

In addition to differences in recommendation and receipt of medications and vaccinations, there were also some major differences in visit documentation among the PTC and PCP groups. The pharmacist providers in the PTC group documented purpose of travel more frequently than the PCPs (99% vs. 55%, P < 0.0001) and also documented activities planned by the traveler more frequently (70% vs. 48%, P < 0.0001) than the PCPs.

There were no statistically significant differences between the two patient populations except for destination and purpose of travel. The PTC saw more travelers to North Africa and also more travelers with volunteer work as their purpose. The PCPs saw more travelers to North and Southeast Asia and also more travelers with study abroad as their purpose. (Table 1). Gender, age, and duration of travel were similar between the two groups.

The two categorical variables that demonstrated a clear statistically significant difference in the multivariate analyses were visit type (PTC vs. PCP) and destination (travel to Southeast Asia vs. others). When indicated, patients in the PTC and those seen by the PCP who were traveling to Southeast Asia were more likely to be ordered the oral Typhoid vaccine (P = 0.0380, OR = 1.743, 95% CI 1.031-2.945) and Tdap (P = 0.0045, OR = 2.204, 95% CI 1.277-3.802) compared to other destinations. However, when indicated travelers who had a visit with a PCP were less likely to be ordered the oral Typhoid vaccine (P = 0.0004, OR = 0.369, 95% CI 0.211-0.643) and Tdap (P < 0.0001, OR = 0.224, 95% CI 0.127-0.395) compared to travelers who visited the PTC. Trip duration and purpose of travel (volunteer and study abroad) did not have a significant effect on whether or not the oral Typhoid vaccine and Tdap were ordered when indicated. When ordered, travelers to Southeast Asia were also more likely to pick-up from the pharmacy azithromycin ($P < 0.0001$, OR = 7.375, 95% CI 3.353-16.22), atovaquone-proguanil ($P < 0.0024$, OR = 2.33, 95% CI 1.351-4.02), oral Typhoid vaccine ($P = 0.0398$, OR = 1.749, 95% CI 1.027-2.981), and to receive Tdap vaccination ($P = 0.0045$, OR = 2.204, CI 1.277-3.802).

Discussion

The results of this study support previous publications illustrating that recommendation of medications and vaccines not consistent with guidelines is a potential problem for PCPs without special training, demonstrating a need for additional education and training. [13, 18-19, 21-22] The most common area in which the PCPs failed to follow national/international guidelines was in the omission of recommended antibiotics for the self-treatment of travelers' diarrhea. The PCPs only ordered an antibiotic for traveler's diarrhea for half of the patients who were indicated and less of their patients picked it from the pharmacy compared to the pharmacists. Since the PTC visits are consistently structured to include extensive counseling on food/water precautions and food/water borne illnesses, this may help explain why higher antibiotic pick-up rates occurred among the PTC group. In both groups, pick-up rates for antibiotics were lower than for antimalarials, suggesting that the study population may perceive food and water borne illnesses as less serious than malaria.

Omission of recommendations for antimalarials and vaccines when indicated was also common among PCPs. Purpose of travel and activities planned were only documented in half of the PCP visits, suggesting that the providers either do not take these variables into consideration or simply do not routinely document these patient specific factors. Practice guidelines suggest taking into account these itinerary variables impacts the assessment of each patient's indication for medications and vaccines, and thus this may have affected PCP recommendations.

The use of medications for travel to destinations where antimicrobial resistance exists, such as ciprofloxacin for travelers' diarrhea in Thailand or chloroquine for malaria chemoprophylaxis in Africa, was another area where the PTC consistently showed higher compliance with the national/international travel guidelines. Other areas of inconsistency between PCP and PTC involved recommendations of vaccines for diseases where no risk exists, such as Yellow Fever vaccine for a traveler to Southeast Asia.

The observations that the PTC saw more travelers with volunteer work as their primary purpose and the PCPs saw more travelers with school as there primary purpose was expected. The pharmacist-run travel clinic frequently conducts group consultations, which can be more convenient for large, organized volunteer groups. Many study abroad programs require a medical exam and clearance prior to a student enrolling, which would necessitate a traveler to have a visit with a PCP. Since visits with the PTC and PCP were equal in length, vaccines were administered in the same clinic, and medications were dispensed from the same pharmacy, these factors should not have influenced outcomes. The PCPs generally had family medicine or internal medicine training background and did receive a 1 hour travel medicine update every year as part of a health center grand rounds program.

While previous studies of international community pharmacists have not been positive toward their travel medicine knowledge, no such study has been conducted in the United States, where all schools of pharmacy confer only the Doctor of Pharmacy degree after 6 to 8 years of training and many graduates pursue post-graduate residencies. With the launch of the Pharmacists Professional Group within the ISTM and more pharmacists sitting for the ISTM CTH® exam, there are likely to be more trained and credentialed pharmacists to serve the traveling public.

Limitations

A limitation of the study is that the patient population consisted of young college students and may not represent the general population. However, their destinations and itineraries mirror populations in other reports. Additionally, appropriate use of vaccines and medications could only be determined by the amount of information provided in the progress note; therefore, if a recommendation was not documented it was assumed that it did not occur. Lastly, due to the retrospective nature of the study, differences in post graduate training of the PCPs and the volume of patients they saw could not be controlled.

Conclusion

A pharmacist-run pre-travel health clinic can provide more consistent evidence-based care compared to primary care practitioners not specifically trained in travel medicine and may improve patient compliance with recommendations. Pre-travel health is a dynamic and specialized field that requires adequate time, resources, and expertise to deliver the best possible care.

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Table 1: Traveler Characteristics

	PTC (N=341)	PCP (N=172)
Gender		
Male	124 (36.36%)	61 (35.47%)
Female	217 (63.64%)	111 (65.53%)
Age		
18-25	259 (75.95%)	124 (72.09%)
26-35	80 (23.46%)	45 (26.16%)
36-45	1 (0.29%)	2 (1.16%)
46-55	1 (0.29%)	0
>55	0	1 (0.58%)
Duration of Travel¥		
<1 week	53 (16.06%)	15 (9.87%)
>1, <2 weeks	104 (31.52%)	53 (34.87%)
>2, <4 weeks	64 (19.39%)	26 (17.11%)
>4, <12 weeks	57 (17.27%)	27 (17.76%)
> 12 weeks	52 (15.76%)	31 (20.39%)
Destinations+		
Central America/Mexico/Caribbean	148 (43.53%)	60 (34.88%)
South America	40 (11.76%)	18 (10.47%)
North Africa* (P = 0.0418)	13 (3.82%)	1 (0.58%)
Sub-Saharan Africa	60 (17.65%)	24 (13.95%)
Middle East (Western Asia)	3 (0.88%)	4 (2.33%)
Western Europe	21 (6.18%)	11 (6.40%)
Eastern Europe	9 (2.65%)	6 (3.49%)
South Central Asia	28 (8.24%)	11 (6.40%)
Southeast & North Asia* (P = 0.0063)	73 (21.47%)	56 (32.56%)
Australia & New Zealand	2 (0.59%)	2 (1.16%)
Purpose of Travel¥ +		
School* (P < 0.0001)	85 (25.30%)	51 (54.84%)
Business	79 (23.51%)	22 (24.18%)
Pleasure	10 (2.98%)	1 (1.11%)
Volunteer* (P < 0.0001)	161 (47.92%)	20 (22.47%)

* = Statistically Significant, + = Values do not add up to 100%, ¥ = Missing Data

Table 2: Order and Receipt of Medications

	PTC (N=341)	PCP (N=172)	P-Value*
Antibiotics			
Ordered when indicated	327 (96.18%)	85 (50.30%)	<0.0001
Received when ordered#	244 (74.62%)	51 (62.96%)	0.0359
Not Consistent with Guidelines			
Not ordered when indicated	21 (6.16%)	84 (48.84%)	<0.0001
Ordered when not indicated	11 (3.25%)	22 (20.56%)	<0.0001
Antimalarials			
Ordered when indicated	220 (97.78%)	111 (81.02%)	<0.0001
Received when ordered#	176 (81.48%)	95 (86.36%)	0.2657
Not Consistent with Guidelines			
Not ordered when indicated	5 (1.47%)	26 (15.12%)	<0.0001
Ordered when not indicated	5 (2.22%)	26 (18.98%)	<0.0001

Medications documented as refused/declined were excluded from the analyses of receipt rates
* Chi-square test (or Fisher's exact test) at 0.05 α level

Table 3: Order and Receipt of Vaccinations

Number of Vaccines Per Patient	PTC (N=341)			PCP (N=172)			P-Value*
	Mean	Median	std	Mean	Median	std	
Ordered when indicated	2.78	3.00	1.49	2.06	2.00	1.34	<0.0001
Received when ordered#	2.38	2.00	1.54	1.95	2.00	1.34	0.0039
Not Consistent with Guidelines							
Not ordered when indicated	0.12	0	0.37	0.78	0	1.00	<0.0001
Ordered when not indicated	0.035	0	0.2	0.18	0	0.49	<0.0001

Vaccinations documented as refused/declined were excluded from the analyses of receipt rates
* Wilcoxon-Mann-Whitney Test (Non-parametric version of independent samples T-test) at 0.05 α level