

Perspective Piece

A Deadly Wait for U.S. Health Insurance Coverage—Sitting on the Couch with Malaria

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Abstract. Uninsured and unprepared travelers to countries with endemic tropical diseases pose great health-care burdens and financial risks on returning to the United States. We discuss the delayed presentation of an uninsured U.S. traveler returning from West Africa with severe malaria who required intensive care measures to save his life. Despite being critically ill on his return, he sat rigoring on his couch taking antipyretics for 3 days, while he applied for insurance on the Affordable Care Act website and waited for approval because he was fearful of the costs of seeking care. He also had limited access to affordable pretravel consultation and prophylactic medications and did not take them because he had no insurance. Average fees for a malaria hospitalization cost \$25,789; however, this patient accumulated fees nearing \$300,000—and his care was reimbursed by emergency Medicaid with \$39,000, because his newly accepted insurance did not cover his hospitalization. This patients' experience in the U.S. health-care system with a deadly tropical disease exemplifies the need for affordable universal coverage of pretravel consultation and malaria prophylaxis. In this uncertain political time and the recent removal of the health insurance mandate, along with the White House and Congress wanting to reform health care, this case supports the American Society of Tropical Medicine and Hygiene (ASTMH) statements showing the need for funding of tropical medicine education, research, and public health services for travelers, not cuts to important agencies and insurances that keep our country safe from imported deadly tropical diseases.

INTRODUCTION

Imported malaria cases are increasing in the United States; however, they can be easily prevented with appropriate chemoprophylaxis. Most travelers to malaria-endemic countries do not adhere to the Centers for Disease Control and Prevention (CDC) recommendations on chemoprophylaxis and are at high risk of developing malaria.¹ Approximately 70% of malaria cases are imported to the United States from Africa.¹ Malaria is associated with high morbidity and mortality, with 182 in-hospital deaths and 4,823 severe malaria cases in the United States between 2000 and 2014.² Herein, we present a case of severe malaria whose delay in seeking care, due to lack of health insurance, almost cost him his life. Primary prevention before, during, and after travel and knowledge of treatment options are areas that need strengthening to prevent tropical diseases in the United States.³ For longer duration trips, consultations can save hundreds of dollars to health-care payers.⁴ We are unaware of the potential costs of treating severe malaria cases in the United States and the potential savings—in lives and costs—with the implementation of preventive strategies within our health-care system. In the current U.S. political situation, we must continue to advocate for affordable medicines that will prevent tropical diseases and strengthen the systems that protect U.S. citizens in our global society. The aim of this perspective piece is to show support for the importance and cost-effectiveness of malaria prophylaxis interventions and travel medicine in the United States.

CASE PRESENTATION

A 32-year-old male U.S. citizen who suffered from nausea, abdominal pain, and fevers boarded his flight in Conakry, Guinea, returning to Denver, Colorado. His symptoms quickly worsened on arrival and he assumed he contracted a tropical illness before departure. Having no health insurance, he quickly applied on the Affordable Care Act website. While waiting for approval, he took acetaminophen and ibuprofen on his couch at home.

This previously healthy male, three days after returning from Guinea, presented to the emergency department with fevers, chills, rigors, nausea, vomiting, diarrhea, and abdominal pain. On examination, he was lethargic, altered, jaundiced, tachycardic, and febrile. Initial laboratories showed acute hemolytic anemia and severe lactic acidosis. His rapid diagnostic test for malaria was positive and blood smear showed *Plasmodium falciparum* parasitemia of 21%. His stool polymerase chain reaction was positive for *Campylobacter*, *Salmonella* spp., enteroaggregative *Escherichia coli*, enteropathogenic *E. coli*, and enterotoxigenic *E. coli*. He rapidly decompensated into septic shock, requiring vasopressors, intubation with mechanical ventilation, and intensive care unit care. He was treated with intravenous artesunate from the CDC. His retinal examination was normal; however, given his severe parasitemia and neurological decompensation, he was suffering from cerebral malaria. His lumbar puncture was negative for a concomitant viral or bacterial central nervous system infection. He required blood transfusions and developed acute respiratory distress syndrome and classic “blackwater fever” where severe hemolysis causes black urine, became anuric, and required dialysis. He completed the artesunate course with rapid improvement in his parasitemia and was started on intravenous doxycycline with a negative blood smear after 48 hours of treatment. He was extubated on day 6 and walked out of the ICU on day 7. He was discharged home on day 13 and

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his renal failure resolved after 3 weeks of dialysis as an outpatient.

EPIDEMIOLOGY IN THE UNITED STATES

Approximately 28 million Americans travel to malaria-endemic countries per year, among them only about 8.5 million visit endemic areas at high risk for transmission and about 500,000 travel to endemic areas in Africa.⁵

There are approximately 1,500 reported cases of malaria annually to the CDC.¹ The annual case incidence rate is about 18 per 100,000 people who travel to areas in those countries endemic for malaria. However, the trend of imported cases of malaria has been steadily increasing. In 2014, there were 1,724 confirmed malaria cases, 66.1% were *P. falciparum*.¹

PRE- AND POST-TRAVEL ACCESS

Most health insurance does not cover the cost of travel clinic visits, tropical vaccines, or malaria prophylaxis. Of the 1,724 confirmed malaria cases in 2014, only 7.8% of cases initiated and adhered to a chemoprophylaxis drug regimen recommended by the CDC, and less than half of travelers take antimalarial medications with them and only one-third seek pretravel advice at travel clinics.^{1,6}

Many travelers have an inaccurate perception of the risks of tropical disease with suboptimal pretravel preparation.^{6,7} Information on travelers' health risks need to be more easily accessible and, in some cases, a mandatory reading before travel. The CDC, ASTMH, and International Society of Travel Medicine have comprehensive resources online.⁸⁻¹⁰

If travel-associated health risks were mandatory readings before obtaining a visa to malaria-endemic countries, it would ensure that at least the basic health risks were relayed on to travelers. The required reading could be through the CDC website and be incentivized through discounted travel clinic visits or prophylactic medications or a free hard copy or mobile application of CDC Yellow Book, or access to travel websites such as Travax, to promote traveler education.^{11,12} After returning to the United States, travel-related health care should be affordable. Knowledge of coverage of travel-associated diseases, such as coverage with emergency Medicaid, should be available to prevent delayed presentations, such as the case we described.

ECONOMIC ANALYSIS

This patient accumulated hospital fees nearing \$300,000; however, emergency Medicaid covered only \$39,000. His newly accepted insurance did not cover his hospitalization because of restrictions in his plan. He did not visit a travel clinic before his departure or take prophylaxis.

The cost of prophylaxis is dependent on the relative cost of malaria medications for a large population versus concentrated costs in a relatively small number of individuals who develop malaria. Common malaria medications are relatively inexpensive: current prices for the five most common antimalarial medications (price per pill) are as follows: mefloquine, \$5.84; chloroquine, \$4.27; doxycycline, \$0.58; atovaquone/proguanil, \$2.08; and primaquine \$1.62.¹³ The following prices are an estimate of a 14-day exposure course including pre- and post-travel prophylaxis: mefloquine \$40.88, chloroquine \$34.16, doxycycline \$25.52, atovaquone/proguanil \$47.84, and primaquine \$37.26. If terminal prophylaxis

after prolonged exposures is required for the prevention of relapsing malaria while taking mefloquine, chloroquine, doxycycline, or atovaquone/proguanil, then primaquine should be included for the last 14 days of treatment with an additional cost of \$22.68.¹⁴

From 2000 to 2014, it was estimated that there were approximately 1,469 malaria-related hospitalizations annually, 22% were considered severe infections and 0.8% resulted in deaths, with an average cost of hospitalization of \$25,789.² This suggests that malaria-associated health-care costs for inpatient care alone were roughly 38 million dollars annually.

Approximately 8.5 million people annually travel to countries that are endemic with malaria and 500,000 to regions of Africa.⁵ If we assume there are 1,500 hospitalizations annually, that 82% of cases are acquired in Africa, and about half of travelers are not treated with malaria prophylaxis and at risk for infection, the risk of U.S. hospitalization is 0.5% on return.^{1,2,7} This suggests that the per capita cost of hospital care for the untreated travelers from Africa is approximately \$127.00, distributed over all at-risk travelers. Note that this excludes many of the standard costs economic studies include in cost-effectiveness studies, such as time lost from work and costs for treatment outside of the hospital.

By contrast, the per capita cost of prophylaxis for 14 days of travel for generic doxycycline is about \$26.00, starting 2 days before and continuing 28 days after travel. Even with adding terminal prophylaxis for relapsing malaria prevention with primaquine, the cost remains low at \$48.20.¹⁴ These basic calculations support the literature that providing prophylaxis before going to an endemic area is likely to be cost reducing for the health-care system, in addition to other opportunity costs, health benefits, and the deaths avoided.

DISCUSSION

This classic case of severe cerebral malaria was saved by intensive care and treatment with investigational artesunate from the CDC. However, his delayed presentation, despite severe symptoms, was because of financial fears, given his lack of health insurance, and cost U.S. taxpayers thousands of dollars. Appropriate pretravel consultation with prophylaxis or oral treatment of malaria on his return could have prevented this outcome. This case is a great lesson in our political climate of uncertain health care, public health policy, and the recent removal of the health insurance mandate. In this perspective piece, we make the argument that we desperately need improved access to preventative care and treatment of tropical diseases.

CONCLUSION

As our case demonstrates, there were many missed opportunities to prevent a life-threatening disease and high economic burden on taxpayers. Access and universal coverage to pretravel tropical medicine consultation and insurance coverage of malaria prophylaxis are cost-effective and must become a priority for health-care reform. Access to information on tropical diseases and clinics abroad is fundamental as part of the pretravel consultation. Finally, access to affordable post-travel care for tropical infectious diseases must be a priority for the U.S. health-care system. As the White House and Congress continue to debate reforming health care in America, we cannot lose sight that imported

tropical diseases pose serious health and economic burdens to our country.

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