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Measles in the 21st Century, a Continuing Preventable Risk to Travelers: Data from the GeoSentinel Global Network

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Abstract

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Measles remains a risk for travelers. Ninety-four measles diagnoses were reported to the GeoSentinel network from 2000–2014; two-thirds since 2010. Asia was the most common exposure region, followed by Africa and Europe. Efforts to reduce travel-associated measles should target vaccine-eligible travelers of all ages, including catch-up vaccination of susceptible adults.

Keywords

Measles; Infection; Travelers; GeoSentinel; Surveillance

Background

Measles is a highly contagious viral disease that can lead to substantial morbidity, including dehydrating diarrhea, pneumonia, encephalitis and death (1–3). Measles is transmitted primarily from person to person by large respiratory droplets but can also spread by the airborne route as aerosolized droplet nuclei (1). The incubation period ranges from 7 to 21 days from exposure to the onset of fever; rash generally appears 14 days after exposure (1). Symptoms include prodromal fever that can rise as high as 105°F (40.6°C), conjunctivitis, coryza, cough, and Koplik spots. A red, blotchy (maculopapular rash appears on the third to seventh day after the prodromal symptoms appear; the rash begins on the face, becomes generalized, and lasts 4–7 days (1).

Introduction of measles-containing vaccine and global vaccination campaigns have greatly reduced the number of endemic measles cases worldwide (4), but virus circulation continues in many parts of the world and has reemerged in areas where it had been eliminated; the disease remains a risk for unvaccinated travelers (1,2,5). Failure to administer measles-containing vaccine routinely to susceptible people, aided by increasing numbers of parents who choose to delay or not vaccinate their children, has led to an increase in susceptible populations that can become infected and maintain transmission (2,6). To document recent measles infections among international travelers, we examined recently reported cases of measles in GeoSentinel, a global clinical surveillance network.

Methods

GeoSentinel is a clinic-based global surveillance network of 57 travel and tropical medicine clinics on 6 continents. GeoSentinel tracks infectious diseases and other adverse health outcomes in returned travelers, foreign visitors, and immigrants; methods are described in detail elsewhere (http://www.cdc.gov/mmwr/preview/mmwrhtml/ss6203a1.htm). We examined GeoSentinel records to find patients with a diagnosis of measles and a clinic visit date from January 1, 2000 to December 31, 2014. Laboratory diagnostics were requested if available; measles vaccination information is not collected routinely within GeoSentinel. We summarized demographic, travel-associated, and geographic variables, excluding from the analysis records from 8 patients traveling for immigration.

Results

During the 15-year study period, 94 measles patients were reported from 30 GeoSentinel clinics on 6 continents. Patients were reported in all years except 2002, and two-thirds were reported since 2010 (Figure). Sixty-three patients were seen after travel and 31 during travel. Among the 81 patients with reported diagnostic information, 77 (95%) were confirmed by positive IgM or PCR; 4 were diagnosed clinically. Fifty-three (56%) were seen as inpatients and 41 (44%) as outpatients. No deaths or episodes of encephalitis were reported.

Sixty-three (67%) patients were male. Median age was 27 years (range 1–57 years); 82 (87%) were aged 18–45 years. Four patients were ≤2 years of age (none were <1 year of age). Tourism (41 patients, 44% of total) was the most common travel purpose, followed by business (27, 29%), visiting friends and relatives (16, 17%), and missionary/volunteer/research/aid workers or students (10, 10%). Eighteen were expatriates, all of whom were business travelers who were citizens of 12 different countries in Asia, Europe, and Africa. Of the 74 patients with information, only 18 (24%) sought a pre-travel medical consultation before their trip.

Among the 89 patients with reported region of exposure, 59 (66%) were exposed in Asia, 35 in Southeast Asia, 17 in South-Central Asia, and 7 in Northeast Asia. Patients exposed in Asia were reported consistently starting in 2003 (Figure). Fifteen (17%) reported exposure in Africa, 14 of them in sub-Saharan Africa and one in North Africa. Eleven (13%) were exposed in Europe, 10 in Western Europe and one in Eastern Europe; 8 were reported during 2011 (Figure). Two (3%) patients were exposed in the Caribbean and 2 (2%) the Middle East. Measles exposure country was reported for 84 patients. Exposure was reported in 30 countries, with the most reported exposures in Thailand (13, 15% of total), India (8, 10%), Singapore (8, 10%), Nepal (7, 8%), China (6, 7%), and the Philippines (5. 6%). Exposure for two patients was likely associated with aircraft flights.

Discussion

Our data indicate that measles has remained a risk for travelers to developing and industrialized nations across the world since the turn of the 21st century. Patients with measles were reported to GeoSentinel all but one year during the study period and from most world regions, highlighting the continued importance of measles vaccination for all international travelers. Although two-thirds of measles diagnoses were associated with exposure in Asia, particularly Southeast and South-Central Asia, there was a surge in measles patients exposed in Western Europe during 2011, corresponding to a large outbreak in Europe (7–9). Additionally, two-thirds of measles diagnoses were reported since 2010, mirroring ongoing measles activity worldwide (2). Although consistent with reports of endemic or increased measles activity, our data are limited by the inability to confirm specific location of exposure for all patients and might also be subject to some reporting bias due to the geographic locations of GeoSentinel clinics and their patient populations.

Measles risk for travelers is not confined to exposure in a destination country, as we identified 2 patients with likely exposure associated with aircraft flights. Measles

transmission has also been reported recently among multiple unvaccinated travelers likely exposed during layovers at an international airport terminal (10). These instances illustrate the additional risk of measles among travelers during transit and the high transmissibility of the pathogen to people in closed or crowded spaces.

Measles continues to affect industrialized countries. Recent importations and resulting outbreaks have been reported in the Americas (11, http://www.paho.org/hq/index.php?option=com_docman&task=doc_view&Itemid=270&gid=29016&lang=en), although measles was eliminated in the United States in 2000 and in the rest of the region in 2002 (4). In addition, measles is reemerging in Europe, as exemplified by the recent outbreaks in Bosnia and Herzegovina, Croatia, and Germany (14, http://ecdc.europa.eu/en/publications/_layouts/forms/Publication_DispForm.aspx?List=4f55ad51-4aed-4d32-b960-af70113dbb90&ID=1285.). These outbreaks not only highlight the risk of measles to travelers to these areas but also demonstrate how infected travelers can infect unprotected people in destination countries or in their home countries upon return, leading to importations and outbreaks. These events also underscore the importance of measles vaccination for all people for whom the vaccine is recommended, including travelers to both industrialized and developing nations.

Tourists and business travelers made up the highest numbers of measles patients reported to GeoSentinel during the study period, consisting of 44% and 29% of cases, respectively. However, cases were also reported among other groups, including those visiting friends and relatives. These data indicate that different types of travelers are susceptible to measles during their trips and stress the need to vaccinate all who meet vaccination criteria. Since travelers to industrialized countries might not seek a pre-travel medical consultation from a travel medicine provider, primary care practitioners should ensure that their patients are protected against measles.

In addition, 87% of reported measles cases were in adults aged 18–45. Measles cases in adults can result in significant morbidity such as during the recent large measles outbreak in France, adults were hospitalized at a greater frequency than infants and incidence of measles-related pneumonia increased with age (7). Although children may be underrepresented in GeoSentinel due to the adult focus of many Geosentinel clinics and the likelihood that children would have been seen by pediatricians or family medicine physicians, the adult patients with measles in this study highlight why clinicians should inquire about the measles vaccination status of their adult patients. Countries have differing guidelines regarding presumption of immunity according to birth year; antibody testing can help determine immunity from previous measles infection or vaccination. Clinicians should vaccinate against measles whenever indicated, including if there is doubt regarding immunity.

Only one-quarter of measles patients in this analysis sought a pre-travel medical consult, where measles and other routine vaccinations can be administered. The World Health Organization recommends immunization against measles for all susceptible children and adults for whom measles vaccination is not contraindicated (3). For example, current U.S. recommendations for protection against measles for people without evidence of measles

immunity includes 2 doses of measles-containing vaccine for people aged ≥12 months and 1 dose of measles vaccine for traveling infants aged 6—11 months (1). Measles vaccination is the best way to protect a traveler against measles and decrease the likelihood of measles importations and resulting outbreaks. Efforts to reduce travel-associated measles should include public health messaging targeted directly to tourist and business travelers, increased attention to catch-up measles immunization of susceptible adults, and increased attention to immunizing vaccine-eligible traveling children and adults.

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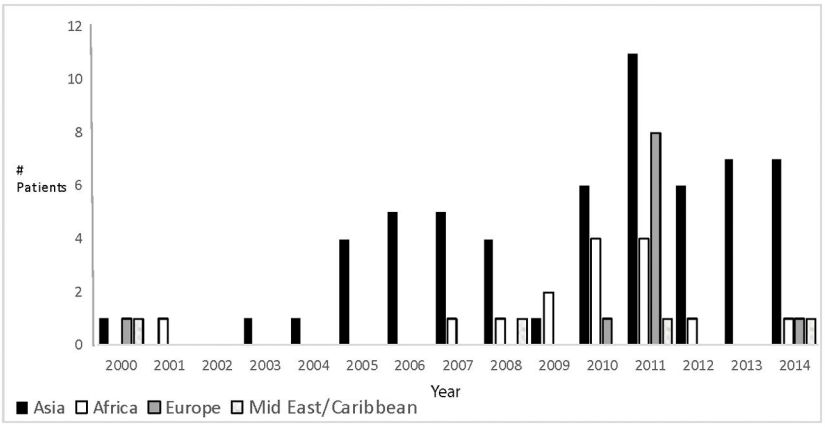

Figure.

Measles patients reported to GeoSentinel 2000–2014, by year and geographic region of exposure (n=89)