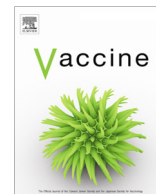


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## Stop measles in Switzerland – The importance of travel medicine

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### ABSTRACT

**Background:** In line with the worldwide strive to combat measles, the Swiss Federal Office of Public Health (FOPH) launched a National Strategy for measles elimination 2011–2015. In this study, we highlight the importance of travel medicine consultations to complement measles vaccination programmes based on data from the Travel Clinic of the University of Zurich.

**Method:** We analysed measles vaccination data from the Zurich Travel Clinic between July 2010 and February 2016 and focused on three groups: (i) all clients who received the measles vaccination, (ii) all clients aged > two years who received the measles vaccination (“catch-up vaccination”), and (iii) all clients aged > two years and born after 1963 (“FOPH recommended catch-up vaccination”).

**Results:** 107,669 consultations were performed from 2010 to 2016. In 12,470 (11.6%) of these, a measles vaccination was administered; 90.9% measles vaccinations were given during a pre-travel consultation, and 99.4% were administered to individuals aged > two years (“catch-up vaccinations”). An “FOPH recommended catch-up vaccination” was received by 13.6% of all Zurich Travel Clinic clients aged >2 years and born after 1963.

**Conclusions:** In this study, we highlight the importance of travel medicine consultations to enhance the measles vaccination coverage in the adult Swiss population.

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### 1. Introduction

Measles is a highly infectious, airborne-transmitted disease with a basic reproduction number of 12 to 18 [1] and is one of the leading causes of death in young children globally. Clinical syndromes include fever, conjunctivitis, coryza, cough, mucosal white spots and a red generalised rash [2]. Case-fatality rates are estimated to be three to five percent in low-income countries while severe complications occur in five to ten percent of measles infections in high-income countries. In rare cases, an acute encephalitis can occur and even years after infection a subacute sclerosing panencephalitis can develop [3].

Globally, significant progress has been made to decrease the contribution of measles to the burden of childhood deaths by

making a safe and cost-effective vaccine available. As a consequence, measles cases have dramatically declined [2].

In line with the Measles and Rubella Initiative [4], supported by the World Health Organization (WHO), the Swiss Federal Office of Public Health (FOPH) launched a National Strategy for measles elimination 2011 to 2015 [5]. In Switzerland, the recommendation for a primary measles vaccination dose was introduced in 1976, and for the secondary dose in 1996. The first measles vaccination is recommended at the age of 12 months followed by the second one between 15 and 24 months [6], however vaccinations are not compulsory in Switzerland. A large percentage of adults has only received one dose during childhood and catch-up vaccinations (defined as: vaccinations after the age of two years) are an important task on the road to measles elimination [7]. The FOPH recommends catch-up vaccinations in all individuals born after 1963 as it is assumed that those born in 1963 or earlier have already acquired lifelong immunity due to natural measles infection.

In Switzerland, the coverage with two measles vaccine doses was 89% in two-year-olds in 2012, but only 77% in 20 to 29-year olds [8]. While coverage has improved in the younger children, it is lingering behind in the adolescents and adults [9,10]. To stop

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the spread of measles, an immunity of 95% of the population is required (herd immunity) [1]. Measles cases dropped from 662 in 2011 to 63 in 2012. In 2013, 176 cases were recorded, 23 in 2014 and 35 in 2015 [11]. Measles incidence was 2.17/100,000 inhabitants in 2013, 0.3/100,000 in 2014, and 0.8 per 100,000 inhabitants in 2016 [12,13]. In Europe, between February 2015 and February 2016, 3118 measles cases were reported [14]. During a large outbreak in Berlin in 2014/2015 a one and a half-year-old boy died due to complications [15].

Recently the Swiss FOPH published a report on administered catch-up vaccinations during the Swiss measles elimination campaign for a representative sample of general practitioners (GPs), internal medicine specialists, and paediatricians [7]. Based on extrapolation of these available data, in 2014, 33,500 catch-up vaccinations were administered by these specialists. Other vaccination settings, such as schools, the Swiss army, gynaecologists and travel medicine clinics were not included. In this study, we illustrate the importance of travel medicine consultations to complement measles catch-up shots based on data from the Travel Clinic of the University of Zurich. The Zurich Travel Clinic is the largest travel clinic in Switzerland (around 17,000 consultations per year); it covers the majority of Zurich travellers seeking pre-travel advice before their trips to tropical/subtropical countries.

## 2. Methods

### 2.1. Data collection

At the Zurich Travel Clinic, all clients complete an electronic form in a closed electronic system before their consultations, including the reason for the consultation and demographic information (sex, age, place of residence). Physicians of the travel clinic routinely verify the information provided by the clients and add data on administered measles vaccinations to the client's record. For this analysis all vaccines containing measles were taken into account, irrespective of being monovalent, trivalent or quadrivalent vaccines. From the data, we could not differentiate between primary and secondary vaccinations. For this retrospective anonymous data analysis, no ethics committee approval was required.

### 2.2. Data analysis

Data were analysed anonymously with Stata 13.1 (StataCorp College Station, TX, USA). Cantons of residence were coded based on places of residence. For continuous variables, the mean and standard deviation (SD) were reported. We focused on three client groups: (i) all clients who received the measles vaccination, (ii) all clients above the age of two years who received the measles vaccination ("catch-up vaccination"), and (iii) all clients above the age of two years and born after 1963 ("FOPH recommended catch-up vaccination").

In order to project how many individuals should have received a measles vaccine, population data for Switzerland was obtained for the years 2011 until 2014 from the Swiss Federal Statistical Office [16] for the respective age groups we looked at in our sample. Based on these numbers, an extrapolation was made to the general population.

## 3. Results

Between July 2010 and February 2016, 107,669 consultations were performed at the Zurich Travel Clinic. Of these, 12,470 (11.6%) measles vaccinations were administered.

While 16.6% of all clients of the Travel Clinic received a measles vaccination in 2010, the percentage dropped to around 8.5% in 2015/2016 (Fig. 1).

Overall 47.9% of Travel Clinic clients were male (50,186). Of all vaccinated clients, 53.7% were male (6650) and 46.3% female clients (5744). The mean age of the vaccinees at measles vaccination was 33.9 years, SD 8.4 years; 50% were vaccinated between the age of 28.6 and 39.5 years. 12,356 vaccine doses (99.5%) were administered to individuals above the age of two years ("catch-up vaccinations", Table 1).

Of the clients aged >2 years and born after 1963, 13.6% received the measles vaccination at our Clinic, compared to only 1.5% of those born in 1963 and earlier. The vast majority (n = 11,010, 90.9%) of measles vaccinations were administered during a travel consultation (Fig. 2).

Most measles vaccinations were administered to clients who were residents of the Canton of Zurich (87.0%) followed by clients residing in the Canton of Aargau (4.1%); 1.5% of clients with a measles vaccination came from the Canton of Zug, 1.4% from Canton of St. Gallen and 1.3% from the Canton of Schwyz. The remaining 4.7% came from all other Swiss cantons and abroad.

Between 2010 and 2016, 13.6% of clients aged >2 years and born after 1963 received an "FOPH recommended catch-up vaccination". As overall measles vaccination numbers in Switzerland are not available, we projected the percentage of measles vaccinated clients to the Swiss general population between 2011 and 2014. Based on the Zurich Travel Clinic data, per year between 555,000 and 850,000 inhabitants of Switzerland, born after 1963 and older than 2 years, should have received a measles vaccination (Table 2).

## 4. Discussion

In the Zurich Travel Clinic, between 2011 and 2016 11.6% of all clients received a measles vaccination during their consultation. More than 90% of measles vaccinations were administered during a travel consultation. The percentage of clients vaccinated against measles aged >2 years who were born after 1963, was even higher

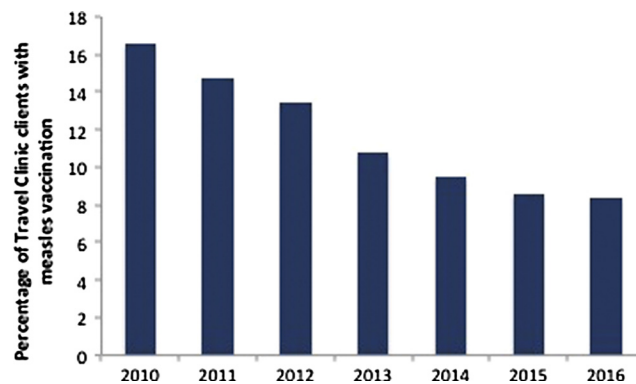


Fig. 1. Percentage of Travel Clinic clients with measles vaccination according to year (2010–2016).

Table 1

Age groups of clients at the Zurich Travel Clinic who received a measles vaccination between July 2010 and February 2016.

Age group	n (%)
≤2 years	70 (0.6)
>2 and <18 years	173 (1.4)
≥18 years and born after 1963	11,877 (95.6)
Born before 1963	306 (2.5)

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