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Measles epidemic in Brazil in the post-elimination period: Coordinated response and containment strategies

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ABSTRACT

The measles virus circulation was halted in Brazil in 2001 and the country has a routine vaccination coverage against measles, mumps and rubella higher than 95%. In Ceará, the last confirmed case was in 1999. This article describes the strategies adopted and the effectiveness of surveillance and control measures implemented during a measles epidemic in the post-elimination period. The epidemic started in December 2013 and lasted 20 months, reaching 38 cities and 1,052 confirmed cases. The D8 genotype was identified. More than 50,000 samples were tested for measles and 86.4% of the confirmed cases had a laboratory diagnosis. The beginning of an campaign vaccination was delayed in part by the availability of vaccine. The classic control measures were not enough to control the epidemic. The creation of a committee of experts, the agreement signed between managers of the three spheres of government, the conducting of an institutional active search of suspected cases, vaccination door to door at alternative times, the use of micro planning, a broad advertising campaign at local media and technical operative support contributed to containing the epidemic. It is important to recognize the possibility of epidemics at this stage of post-elimination and prepare a sensitive surveillance system for timely response.

1. Introduction

Measles is a highly contagious infectious disease; its major complications include pneumonia, encephalitis, and death [1,2]. The global strategy for eliminating measles is based on the fact that it is only transmitted between humans, the existence of an effective vaccine that provides protection for a long time, and the cost-effectiveness of immunization activities [3,4]. The benefits of the vaccine are undeniable, and the morbidity and mortality statistics clearly reflect the impact of the introduction of vaccines and high vaccination coverage in specific populations [5]. Despite the existence of a vaccine, measles remains a major cause of morbidity and mortality among children under five years, especially children who are malnourished and those living in countries with weaker economic development [6].

The endemic transmission of the measles virus from other parts of the world remains a risk for regions that have eliminated the disease, and unless there is an interruption of the virus's transmission worldwide, there is the possibility of imported cases and outbreaks. Although measles was declared eliminated in the Americas in 2002 [7,9], sporadic introductions end up in transmission chains [10–15], which are extended depending on the routine vaccination coverage of the resident population [16]. Thus, the main challenges for maintaining measles elimination are sensitive surveillance, an effective response to the import of wild virus, homogeneous and routine vaccination coverage (>95%) in cities and integrated action plans that involve intersectoral activities, including the private sector [17–25].

In northeastern Brazil, there was a measles epidemic between 2013 and 2015 that lasted 20 months and affected 1052 people

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in 38 cities in the State of Ceará after 13 years without an endemic outbreak [10].

This article describes the strategies adopted and the effectiveness of the surveillance and control measures implemented during the epidemic in an attempt to understand the challenges posed by the regional context of post-measles elimination and explain the actions taken to prevent the re-establishment of endemic transmission when the virus is imported.

2. Methods

A descriptive study was conducted to examine immunization strategies, epidemiological and laboratory surveillance, and communication to contain and halt the chains of measles transmission during an epidemic between December 2013 and October 2015.

2.1. Data source

Data were collected from the Compulsory Notification Disease Information System (SINAN) of the Ministry of Health of Brazil, to which suspected cases of measles are reported. Additionally, the laboratory results were analysed through the Laboratory Environmental Management System (LAG) of the Central Laboratory of Public Health of Ceará (LACEN). Vaccination data were collected through the National Information System of the Immunization Programme (SIPNI), which aggregates data regarding routine vaccination coverage or vaccination campaigns. Data were also collected from field research reports, minutes of meetings that occurred during the epidemic, and the final report by the State Department of Health of Ceará on the closure of the epidemic.

2.2. Periods analysed

To analyse the actions taken to fight the measles epidemic in Ceará, the epidemic was divided into four stages (Fig. 1).

1st period: the introduction of the measles virus and its spread to cities in the metropolitan region of Fortaleza (Epidemiological week (EW) 52/13 to 10/14 – December 25, 2013, to March 8, 2014);

2nd period: interiorization of the virus and its spread to the countryside cities of the state (EW 11 to 42/14 – March 9 to November 18, 2014);

3rd period: maintenance of virus transmission in the cities of Fortaleza and Caucaia (EW 43 to 53/14 – November 19, 2014, to December 31, 2014;

4th period: transmission control and evidence of interruption of the virus's circulation (EW 01 to 27/15 – January 1, 2015, to July 6, 2015; Fig. 1).

2.3. Operational definitions of immunization measures

The calculation of routine vaccination coverage (RVC) was based on the number of applied MMR doses (measles, mumps and rubella [MMR]) by age group and city of residence divided by the total population of the vaccine's target age group during the same period, expressed as a percentage. The data used are public and are available at DATASUS (PNI and demographic data) [18].

The **contact vaccine** was administered with the MMR vaccine or the double virus vaccine (measles and rubella [MR]) in contacts over the age of six months within 72 h of contact. This measure included those with contact with the places where suspected cases were located during the disease's period of communicability.

As part of the rapid monitoring of routine vaccination coverage (MRC), city health teams used maps of census sectors, list of localities produced by endemic disease control agents, territorial areas of primary care, neighbourhood divisions/blocks from the city administrative regions, among other factors, to identify, enumerate and select the sectors in which interviews would be performed. The participating households in each sector were selected through convenience sampling. The number of people interviewed in each RCM was obtained by dividing the target population by the number of vaccine clinics in the city, as follows: when the result was <1000, ≥1000 and <5000, ≥5000 and <10,000 and ≥10,000, the numbers of people interviewed in the target population were 25, 50, 75 and 100, respectively [18].

The scanning vaccination, also called the cleaning operation, is an activity in which the vaccination status of all individuals aged 6 months to 49 years is checked by going door to do and vaccinating people selectively according to their vaccination his-

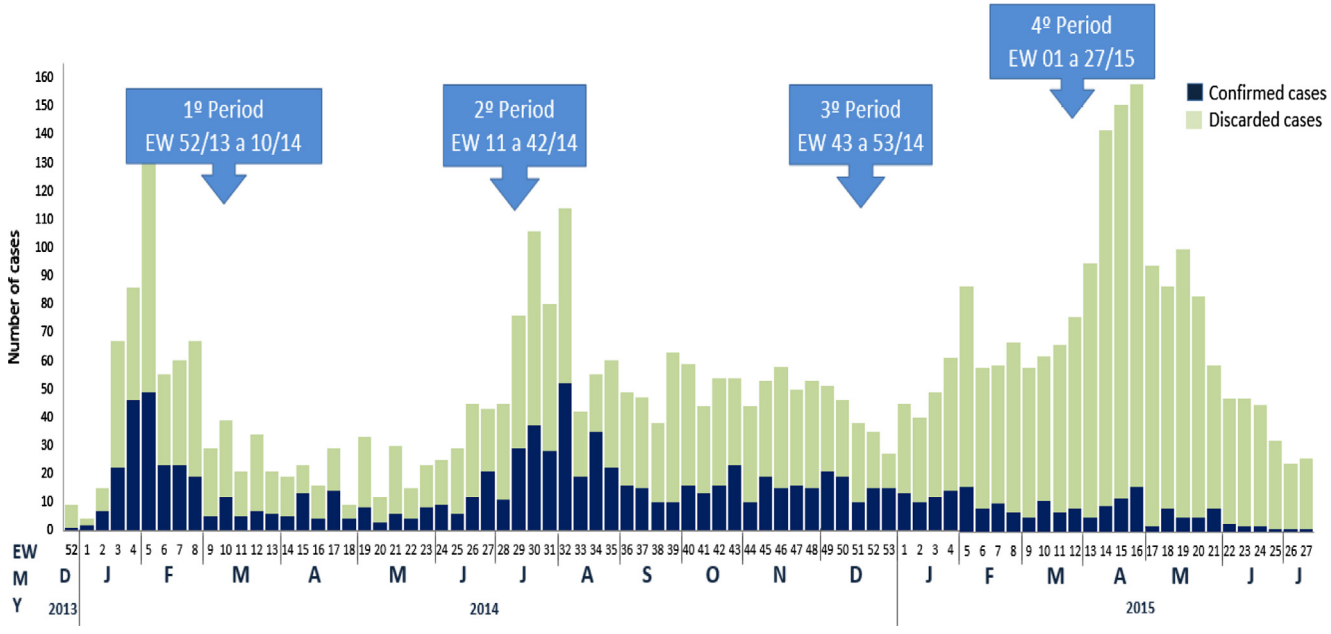

Fig. 1. Period of measles epidemic in Ceará, 2013–2015.

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