



Diphtheria outbreak in Lao People's Democratic Republic, 2012–2013 [☆]



Carolyn Sein ^{a,*}, Tejpratap Tiwari ^b, Adam Macneil ^a, Kathleen Wannemuehler ^a, Chanthavy Soulphy ^c, Phouthone Soulliphone ^c, Rita Reyburn ^d, Alejandro Ramirez Gonzalez ^d, Margaret Watkins ^a, James L. Goodson ^a

^a Global Immunization Division, Center for Global Health, Centers for Disease Control and Prevention, United States

^b Division of Bacterial Diseases, National Center for Immunization and Respiratory Diseases, Centers for Disease Control and Prevention, United States

^c National Center for Laboratory and Epidemiology, Ministry of Health, Lao People's Democratic Republic

^d World Health Organization, Lao People's Democratic Republic

ARTICLE INFO

Article history:

Received 26 April 2016

Received in revised form 22 June 2016

Accepted 24 June 2016

Available online 12 July 2016

Keywords:

Diphtheria

Lao PDR

Outbreak

Vaccination

Vaccine-preventable

ABSTRACT

Background: Diphtheria is a vaccine-preventable disease. When vaccination coverage and population immunity are low, outbreaks can occur. We investigated a diphtheria outbreak in Lao People's Democratic Republic that occurred during 2012–2013 and highlighted challenges in immunization services delivery to children in the country.

Methods: We reviewed diphtheria surveillance data from April 1, 2012–May 31, 2013. A diphtheria case was defined as a respiratory illness consisting of pharyngitis, tonsillitis, or laryngitis, and an adherent tonsillar or nasopharyngeal pseudomembrane. To identify potential risk factors for diphtheria, we conducted a retrospective case-control study with two aged-matched neighborhood controls per case-patient in Houaphan Province, using bivariate analysis to calculate matched odds ratio (mOR) with 95% confidence intervals (CI). Reasons for non-vaccination among unvaccinated persons were assessed. **Results:** Sixty-two clinical cases of diphtheria and 12 diphtheria-related deaths were reported in seven of 17 provinces. Among case-patients, 43 (69%) were <15 years old, five (8%) reported receiving three DTP doses (DTP3), 21 (34%) had received no DTP doses, and 35 (56%) had unknown vaccination status. For the case-control study, 42 of 52 diphtheria case-patients from Houaphan province and 79 matched-controls were enrolled. Five (12%) case-patients and 20 (25%) controls had received DTP3 (mOR = 0.4, CI = 0.1–1.7). No diphtheria toxoid-containing vaccine was received by 20 (48%) case-patients and 38 (46%) controls. Among case-patients and controls with no DTP dose, 43% of case-patients and 40% of controls lacked access to routine immunization services.

Conclusion: Suboptimal DTP3 coverage likely caused the outbreak. To prevent continued outbreaks, access to routine immunization services should be strengthened, outreach visits need to be increased, and missed opportunities need to be minimized. In the short term, to rapidly increase population immunity, three rounds of DTP immunization campaign should be completed, targeting children aged 0–14 years in affected provinces.

© 2016 Elsevier Ltd. All rights reserved.

1. Introduction

Diphtheria is a vaccine-preventable disease caused by *Corynebacterium diphtheriae* that is transmitted from person-to-

person through close physical contact and respiratory droplets. Severe diphtheria infection results in the formation of a pseudomembrane in the respiratory tract causing nasopharyngeal obstruction and death [1] (Fig. 1). Cardiovascular, neurological and renal complications resulting in death can occur weeks after acute infection [2]. Diphtheria case-fatality ratio (CFR) can be 10–50% depending on the severity of illness at presentation, vaccination status of the patient, timeliness of diphtheria anti-toxin (DAT) administration, and the level of medical care available [2]. In all countries, priority should be given to efforts to reach at least 90% coverage with three doses of Diphtheria and Tetanus Toxoids and Pertussis (DTP) vaccine in children below one year of age, in

^{*} The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the World Health Organization or the Centers for Disease Control and Prevention.

^{*} Corresponding author at: MBBS, MIPH, Global Immunization Division, Centers for Disease Control and Prevention, 1600 Clifton Road, NE, MS-92, Atlanta, GA 30333, United States.

E-mail address: seinc@who.int (C. Sein).

¹ Current address: Research and Product Development, Polio Eradication Department, World Health Organization, Avenue Appia 20, CH-1211 Geneva, Switzerland.



Fig. 1. (a and b) Physical signs of diphtheria infection: pseudomembrane in 1a (Houaphan Province), and bull neck in 1b (Vientiane Capital)* – Lao People's Democratic Republic, 2012–2013.

*Photos sourced from and used with permission from the National Center for Laboratory and Epidemiology, Ministry of Health, Lao People's Democratic Republic.

order to prevent ongoing transmission of diphtheria and outbreaks from occurring [3].

A diphtheria vaccine has been available since 1923, and a combined DTP vaccine since 1948. In 1974, the Expanded Programme on Immunization (EPI) was established by the World Health Organization (WHO) to provide universal childhood immunizations for six diseases: polio, tetanus, diphtheria, pertussis, measles and tuberculosis. WHO recommends that the routine childhood schedule should include a full primary course of three DTP doses (DTP3) to be administered in the first year of life. Three doses of diphtheria toxoid-containing vaccine are required for a protective effect [4]. Globally, following increased DTP3 vaccination coverage, the number of cases of diphtheria reported to WHO decreased from 98,000 in 1980 [4] to 4490 in 2012 [4–6].

In Lao People's Democratic Republic (Lao PDR), the national EPI started in 1979 [7]. In 2012, the routine childhood immunization schedule included three doses of DTP combined with Haemophilus influenzae type b and Hepatitis B virus antigens as a pentavalent vaccine administered at 6, 10 and 14 weeks [7]. Despite improvements in DTP3 coverage (from 4% in 1985, to 48% in 1996 to 78% in 2012), multiple outbreaks of diphtheria were reported (Fig. 2) [6]. During 1980–1996, the annual number cases of diphtheria reported to WHO was <100, except for outbreaks reported in 1982 (813) 1987 (189), 1994 (193), and 1996 (319). During 1997–2012, the number of annual reported cases of diphtheria was <15 each year, except for peaks in 2002 (40), 2003 (116), 2010 (34), 2012 (130) and 2013 (20) (Fig. 2).

To identify the likely causes of the outbreak, we conducted an investigation to (1) review DTP3 vaccination coverage during 1980–2012, (2) describe characteristics of case-patients and the outbreak during April 1, 2012–May 31, 2013, and (3) conduct a case-control study to assess risk factors for diphtheria. As part of the investigation we also visited health care facilities at national, provincial, district and rural levels of the health system, to review available national protocols and guidelines on case detection and treatment.

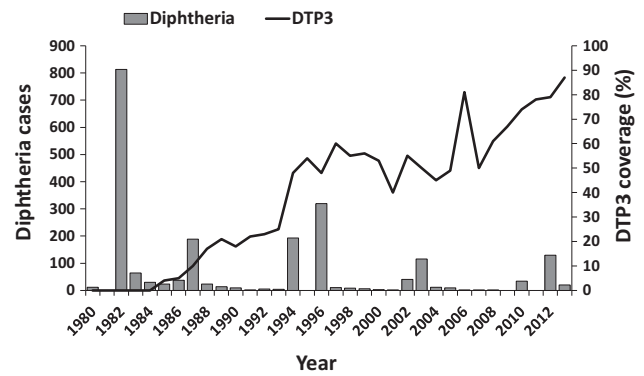


Fig. 2. Reported confirmed diphtheria cases* and estimated coverage** with three doses of diphtheria-containing vaccine (DTP3) among children aged 12–23 months – Lao People's Democratic Republic, 1980–2013.

*Confirmed diphtheria cases reported to the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) through the Joint Reporting Form (JRF). WHO Regional Office for the Western Pacific Region.

**WHO/UNICEF estimates of national immunization coverage: http://apps.who.int/immunization_monitoring/globalsummary/incidences?c=LAO.

2. Methods

We reviewed WHO/UNICEF estimates of national immunization coverage with DTP3 for children aged one year in Lao PDR during 1980–2012. National EPI staff analyzed national and provincial administrative vaccination data for 2012 from the National Immunization Program (NIP) and calculated administrative DTP3 coverage as the number of DTP3 doses administered divided by the target population of surviving infants aged <1 year, with projected target population estimates based on the 2005 census from the Lao Statistics Bureau. We mapped administrative DTP3 coverage by province for 2012.

The MOH reported the annual number of cases of diphtheria to WHO and UNICEF using the WHO-UNICEF Joint Reporting Form. Diphtheria is one of 17 notifiable diseases reported to the National Center for Laboratory and Epidemiology (NCLE), Ministry of Health, Lao PDR. The national clinical case definition for diphtheria was an illness with laryngitis or pharyngitis or tonsillitis, and an adherent pseudomembrane of the tonsils, pharynx or nose. Provincial surveillance officers investigated patients with suspected diphtheria, using a case investigation form (CIF) to collect information on demographic characteristics, village and district of residence, symptom onset date, clinical symptoms, vaccination history, and laboratory specimens, if collected. In provinces with multiple reported cases, surveillance officers recorded data using a line-list form. Surveillance officers submitted CIFs and line-lists to the NCLE, and data assistants entered the information into an electronic database. We reviewed individual diphtheria case reports and the NCLE database to identify those meeting the national case definition. In Lao PDR, laboratory confirmation is not required for classification as a confirmed case.

During the investigation we visited nine health facilities (one city hospital, four provincial hospitals, one district hospital, three rural health facilities). We reviewed national protocols and guidelines on case detection and treatment and conducted informal interviews to determine health worker knowledge of diphtheria symptoms, investigation and treatment.

We conducted a retrospective case-control study during June 8–16, 2013 to determine risk factors for diphtheria during the outbreak in Houaphan Province where the majority of reported cases occurred. A case-patient was identified as a person meeting the

Download English Version:

<https://daneshyari.com/en/article/10962354>

Download Persian Version:

<https://daneshyari.com/article/10962354>

[Daneshyari.com](https://daneshyari.com)