1. INTRODUCTION

1.1 Background

In many countries neonatal tetanus is responsible for half of all neonatal deaths due to vaccine-preventable diseases and for almost 14% of all infant deaths. It is estimated that in the 1970s more than 10,000 newborns died annually from neonatal tetanus in the Americas. Neonatal tetanus is prevented by immunization and/or assuring clean delivery and post-delivery practices.

In 1989, the World Health Assembly adopted a resolution calling for the elimination of neonatal tetanus throughout the world by 1995 and the resolution was endorsed by the Directing Council of PAHO. Ministers of Health of PAHO Member Countries initiated specific program activities to eliminate neonatal tetanus with support from PAHO and a variety of international agencies. These activities take place within the wider context of the Expanded Program on Immunization (EPI) and existing programs on family and community health and benefit from knowledge acquired in polio and measles eradication programs. It is recognized that the program to eliminate neonatal tetanus as a public health problem differs from other eradication programs, such as those for smallpox and polio, in that even after the goal of zero cases is reached, the potential for return of the disease is always present. Therefore, the issue of sustainability is of paramount importance.

1.2 Program Strategy

Neonatal tetanus control can be achieved faster if efforts and resources are concentrated in high-risk geographic areas. The identification of these high-risk municipalities/districts allows health authorities to know where to implement the main strategy of the program, that is, the vaccination of all women of childbearing age with at least two doses of tetanus and diphtheria toxoid (Td). It should be noted that although tetanus toxoid (TT) alone provides immunity against tetanus and is mentioned in this report, the administration of tetanus and diphtheria toxoid (Td) is recommended because it provides the opportunity to maintain immunity to both diphtheria and tetanus in adults. To meet the goal of elimination of neonatal tetanus, it will be necessary to intensify all principal components of the EPI and programs for family and community health.

For operational purposes, neonatal tetanus is considered to be eliminated as a public health problem when all municipalities of a country have annual neonatal tetanus rates of less than 1 per 1,000 live births. However, this criterion should be analyzed carefully before applying it in the field, since, for example, if a municipality of one million inhabitants with about 30,000 annual births reports 29 cases of tetanus per year, it would meet the criterion for elimination, but in practice this level
of tetanus would be unacceptable. In municipalities with very low population density, the opposite situation could occur. For this reason, although the criterion for elimination has been defined, it is advisable to evaluate achievement of the goal or progress made in this regard in relation to the specific characteristics of each country and municipality.

To meet the goal of elimination of neonatal tetanus, it is recommended that all countries do the following:

- Establish or intensify a tetanus surveillance system to record neonatal and non-neonatal tetanus cases separately.
- Investigate all neonatal tetanus cases and institute active searches for cases in areas which are thought to be “silent” for neonatal tetanus. A “silent” area is one that has or is likely to have unreported neonatal tetanus cases.
- Concentrate vaccination efforts among women of childbearing age who live in high-risk areas, ensuring that every contact with these women provides the opportunity for vaccination. At the same time, it should be ascertained that women are keeping a permanent immunization record.
- Ensure that traditional birth attendants participate in tetanus toxoid vaccination activities and surveillance for neonatal tetanus.
- Utilize newer and simpler injection technologies, which can be used easily by lay personnel and introduced for routine use in national immunization programs.
- Improve clean delivery and post-delivery practices.

After reading this manual, health workers should be able to accomplish the following tasks necessary for the success of this program:

- Establish and/or expand active surveillance at sites where neonatal tetanus cases are most likely to be heard about or seen (such as hospitals, clinics, and churches), and begin educational and promotional activities to improve detection and reporting of suspected neonatal tetanus cases;
- Determine whether a suspected case of neonatal tetanus meets clinical criteria for confirming the diagnosis;
- Conduct an ongoing assessment of case data on newborns with tetanus, including a thorough investigation of the circumstances surrounding each case, and identify risk factors;
- Develop special vaccination programs in areas at highest risk of neonatal tetanus (based on disease surveillance, population, and coverage data);
Conduct selected reviews of birth practices to promote educational campaigns targeted at high-risk and problem communities.

**1.3 Program Management**

For a program of this magnitude to succeed, a well-coordinated and managed approach is necessary. This usually requires both centralized responsibility for all surveillance and control activities and decentralization, so that health workers have enough authority and flexibility at the local level to conduct program activities. The program manager must use the epidemiologic investigation data to direct the program and to supervise and evaluate activities, and ensure that resources are assigned to high-risk areas. All activities should be detailed in a national plan of action, which should form the basis for local plans of action (Annex 1).

Direct functional links must be established between the epidemiology and management components of the program and will require the exchange of reports and definition of tasks and duties related to the elimination program. Close collaboration should be maintained at every level between staff engaged in maternal and child health care and staff involved in the Expanded Program on Immunization. A national Interagency Coordinating Committee (ICC) should be established so that all involved agencies, both public and private, will have a clear idea of what each agency’s commitments are to the program.

Training and management seminars play an integral role in the implementation of the neonatal tetanus elimination strategy. Development of workshops both for surveillance and for evaluating high-risk areas is a priority.

**1.4 Information Systems**

An important aspect of a successful program is a well-developed information system that provides program managers and health workers with the necessary information for taking appropriate actions (see Annex 2). Information from the disease surveillance system must be summarized into regular, useful reports and provided to all responsible health staff and to program managers.

Certain basic information needs to be collected, analyzed, and reported at the country level. These data include the following:

- Current listings of all suspected, confirmed, and discarded cases;
- Listings of municipalities at high risk of neonatal tetanus;
- Population of women of childbearing age by municipality;
- Number of doses of Td1, Td2, Td3, Td4, and Td5 (i.e., first, second, third, fourth, and fifth doses of adult tetanus diphtheria toxoid) delivered to women of childbearing age. Each country should define the group of women of child-
bearing age. In general, this group includes 15–45-year-old women, but in many places the first pregnancy occurs at a very early age (starting at 12 years) and in others the reproductive age extends to 49 years;

- Listings of types of deliveries by municipality/district;
- Listings of reporting sites and records of compliance with required weekly reporting.

In addition, summarized information on disease occurrence and control activities should be kept up-to-date, so that the current neonatal tetanus situation within a country can be evaluated at any given time (see Annex 3 for a sample form).

# 2. EPIDEMIOLOGY OF NEONATAL TETANUS

## 2.1 Occurrence

Records dating from the fifth century B.C. mention clinical illness that is consistent with tetanus. Even today, neonatal tetanus remains an important cause of preventable morbidity and mortality in developing countries. *Clostridium tetani*, the microorganism that causes neonatal tetanus, is ubiquitous but it is most frequently found in densely populated regions with hot, damp climates where the soil is rich in organic matter. Neonatal tetanus is most common in developing countries and rarely occurs in industrialized countries where improvements in delivery practices have been made and nearly universal tetanus immunization has been achieved. In developing countries, the disease usually occurs among marginalized populations living in peripheral urban and certain rural areas.

The results of community studies performed at the beginning of the 1970s and 1980s in Latin America and other developing countries show that the mortality rate from neonatal tetanus ranged from less than 5 to more than 60 cases per 1,000 live births. In some developing countries these deaths represented between 23% and 72% of all neonatal deaths. The estimate of yearly deaths worldwide due to neonatal tetanus is now placed at over half a million. Tetanus cases remain substantially underreported in most countries. WHO estimates that in some countries with deficient surveillance procedures, the regular notification systems only detect about 5% of the actual number of cases. In the Region of the Americas, PAHO estimates that in the 1970s regular reporting systems detected only 10% of the true number of cases.

## 2.2 Epidemiologic Characteristics

**Sex.** Reports gathered from both hospital and community-based surveys indicate that the ratio of male to female neonatal tetanus cases worldwide usually ranges from 1:1 to 1:3. One possible explanation for this predominance of female over