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Completeness of reporting and case ascertainment for neonatal tetanus in rural Pakistan

Jonathan A. Lambo [a,*], Zahid H. Khahro [b], Mahmood I. Memon [c], Muhammad I. Lashari [d]

[a] Faculty of Health Sciences, University of Lethbridge, Lethbridge, Alberta, T1K 3M4, Canada
[b] World Health Organization Sindh, Provincial Directorate/Expanded Program on Immunization Office, Karachi, Pakistan
[c] Contech International, Faisal Town, Lahore, Pakistan
[d] Civil Hospital, Dadu, Dadu District, Pakistan

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SUMMARY

Objectives: The objectives of this study were to assess the case ascertainment and completeness of neonatal tetanus (NT) reporting and to estimate the incidence of NT in Dadu District, Pakistan.
Methods: We conducted active surveillance and hospital record reviews for suspected NT cases. We compared the cases of NT reported to the routine surveillance system with the cases identified through the hospital record reviews for 1993 through 2003. The two-source capture–recapture method was used to evaluate case ascertainment in the routine surveillance system and to estimate the incidence of cases of NT.
Results: Active surveillance and hospital record reviews identified 134 cases in addition to 274 cases in the routine surveillance system. The two-source capture–recapture method indicated that there would have been 463 cases during this period (95% confidence interval (CI) = 418–508), representing an average annual incidence of 0.62 per 1000 live-births. The overall completeness of routine reporting was 59.2%. The proportions of cases reported were 68.1% for government hospitals and 53.8% for private reporting sites.
Conclusions: Reporting of NT cases is incomplete. Active promotion of private sector participation, community involvement, and strengthening of the government sector as a way of improving NT reporting and surveillance is strongly suggested.

1. Introduction

The success of an immunization program in reducing the morbidity and mortality from vaccine-preventable diseases can be measured only if there is a reliable disease surveillance system.[1] Neonatal tetanus (NT) is the second leading cause of death from childhood vaccine-preventable diseases worldwide[2] and one of the most underreported diseases.[3] Underreporting of NT cases is of major public health concern to the global elimination of neonatal tetanus. Concerns about the underreporting of NT in developing countries have limited the impact of surveillance on disease control strategies, yet little consideration has been given to ways of improving the reporting system.

Completeness of reporting depends primarily on three elements.[1] First, the public must have access to health services, and second, must use them. Third, the health services must report cases accurately and regularly to the appropriate health authorities.[1] Community-based NT mortality surveys indicate that current surveillance systems as used in developing countries detect only 2–8% of cases.[1,3–6] The World Health Organization (WHO) received reports of only 9318 cases of NT in 2004,[7] compared to an estimated 128 000 NT deaths.[8]

NT is a highly fatal infection of the neonatal period, usually occurring in rural settings where there is poor access to health facilities and most deaths occur at home, with birth and death not being reported.[9] The development of effective surveillance through correct and accurate reporting will not only help to target and evaluate interventions,[9] but will also replace the survey method for obtaining data on the morbidity and mortality of NT.[4] Integration and expansion of acute flaccid paralysis (AFP) surveillance with measles and NT reporting,[9–11] building on the experience of polio surveillance and community-based NT reporting,[12] are some of the WHO recommendations for improving NT surveillance.

As at December 2010, Pakistan is one of the 39 countries that have not achieved maternal and neonatal tetanus (MNT) eradication.[13] WHO recommends that surveillance systems should be sufficiently sensitive to detect an annual rate of less than 1 NT case/1000 live-births at the district level as a target for global elimination; maternal tetanus is considered eliminated when NT

* Corresponding author. Tel.: +1 403 329 2676; fax: +1 403 329 2668.
E-mail address: jonathan.lambo@uleth.ca (J.A. Lambo).

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is eliminated.[9] The main elimination strategies are: promotion of clean delivery services, immunization of women with a tetanus toxoid (TT)-containing vaccine, and effective surveillance.[8,9]

Dadu District (area 7866 square km, population 1.5 million; capital Dadu Town) is in the northern part of Sindh Province. Surveillance for NT began in the district in 1992, and beginning in 2004, NT was actively integrated into AFP surveillance and the district began to include suspected NT and measles cases in the monthly reports. We perceived a need to have baseline information prior to the change; however, our emphasis is on the evaluation of the surveillance prior to the change.

2. Methods

2.1. Active surveillance and retrospective record reviews

This work was carried out as part of the surveillance program for the country and ethical review was not required. To evaluate completeness of reporting and identify cases that were not previously reported, active surveillance for suspected NT cases was conducted in 2005 during reviews of hospital case records – surveillance records and registers of seven government hospitals and five private reporting sites (i.e., pediatricians in private clinics). In addition, the medical records of the five private reporting sites and of five tertiary referral hospitals in the areas adjacent to the district were reviewed for diagnoses relating to NT after administrative consents were obtained.

We also checked for the presence of vital events registries, inpatient registers, outpatient registers, Health Management Information System (HMIS), and standard case definitions for NT, AFP, and measles[14] in the seven government hospitals and the five private reporting sites. These records included both admission and discharge records. Each case had been diagnosed by a physician and classified as NT according to the WHO recommended case definition as follows: a case was defined as a neonate with normal ability to suck and cry during the first 2 days of life and who, between 3 and 28 days of age cannot suck normally and becomes stiff or has spasms.[14] Admission and discharge diagnoses of the cases were then reviewed and those cases for which the diagnosis was consistent with NT as defined by WHO were placed into a separate file (hospital case records/registers). NT case reports that were line listed in the surveillance register during 1993–2003 were checked for double-reporting and placed in a separate file (NT line list).

2.2. Neonatal tetanus case reporting

We compared the NT reporting from the 12 hospitals with the five private reporting sites. In exploratory analyses, notified cases were compared to the non-notified with respect to gender, age at onset of symptoms, age at admission, delay in presentation, residence, reporting sites, and final outcome for the child (dead or alive). All exploratory analyses were done at alpha = 0.05 for descriptive purposes.

2.3. Case ascertainment and data sources

For this study, the primary ascertainment source was the NT line list. The secondary ascertainment source comprised the hospital case records/registers. The two databases were then compared to each in order to identify cases common to both sources. The comparison was done using defined variables such as names, age, sex, date of birth, place of residence, and admitting hospital as identifiers.

2.4. Estimating the incidence of NT

The average annual incidence of NT was based on the total number of NT cases obtained by summing the number found only in the NT list and the number found in the hospital case records/registers. We used the two-source capture–recapture method to estimate the incidence of NT cases and to evaluate the case ascertainment during the period 1993–2003. The model used in this study has been described previously for the estimation of the incidence of AFP and for AFP case ascertainment.[15] The model is based on the comparison of cases from two sources for the estimation of the total number of cases, N, given by the expression: $N = ab/c$, where a is the total number of cases from the primary source, b is the total number ascertained from the secondary source, and c is the number of cases common to both sources.[15]

An estimate was made for the 11-year period. Data were entered into Excel spreadsheet and analyzed with SPSS version 12.0 for Windows (SPSS Inc., Chicago, IL, USA).

3. Results

A total of 408 NT cases were identified, comprising 274 reported cases (NT line list) and 134 cases that were found by active surveillance. The NT line list did not capture the 134 cases that should have been reported by the physicians in hospitals and at private reporting sites. Based on the 274 reported cases, this was equivalent to an average annual incidence of 0.37 per 1000 live-births. Active surveillance identified an additional 134 NT (32.8%) that had not been reported. Thus the average annual incidence in routine surveillance based on a total of 408 cases was 0.55 per 1000 live-births.

The primary and secondary sources identified 274 and 328 cases, respectively, and 194 cases that were common to both. The 328 NT cases included 194 cases detected in both the NT line list and the hospital case records/registers, 32 cases found only in the hospital registers, and 102 cases ascertained only by the hospital case records that met the case definition after review. Forty-eight cases in the NT line list could not be ascertained by the secondary source. The estimated crude total number of expected NT reports was 463 (95% CI = 418–508) (Table 1). The average annual incidence of NT was estimated to be 0.62 per 1000 live-births (capture–recapture method).

Case ascertainment based on routine surveillance was estimated to be 59.2% (274/463) complete. Based on the estimated crude total number of expected NT reports of 348 (95% CI = 298–398) for males and 115 (95% CI = 57–173) for females, the overall completeness of routine reporting was 60.6% (211/348) for males and 54.8% (63/115) for females (capture–recapture method). Figure 1 shows the trend in estimated completeness. The trends in reporting completeness show that after an initial increase to 81% in 1994, completeness fluctuated between 63% and 74% during 1995–1999 and then decreased from 35% in 2000 to 19% in 2002, concurrent with an increase in the number of unreported cases.

Further analysis showed that of the 134 cases that were identified through active surveillance, 122 (91.0%) were found in government hospitals and 12 (9.0%) at private reporting sites. Records of 105 cases (78.4%) that were not previously reported were found in registers in government hospitals, emphasizing the significance of actively searching for suspected NT cases during routine reviews (Table 2). Routine reviews of registers in the seven hospitals and in the five private reporting sites showed that none of the hospitals and private reporting sites had birth registers, and only two out five private reporting sites (40%) had standard case definitions of AFP, measles, and neonatal tetanus (Table 3). The government hospitals sent 260 (94.9%) routine NT reports, while the private reporting sites accounted for 14 (5.1%) reports. Overall,