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Conference report

Reducing global disease burden of measles and rubella: Report of the WHO Steering Committee on research related to measles and rubella vaccines and vaccination, 2005

Abstract

The WHO Steering Committee reviewed and evaluated the progress towards global control of measles and rubella and provided guidelines for future research activities concerning both diseases during its meeting in New Delhi, in April 2005. Global measles vaccination coverage increased from 71% in 1999 to 76% in 2004 and indigenous transmission was interrupted or kept at very low levels in many countries. However, Africa and Southeast Asia continue to experience endemic transmission and high mortality rates, despite a global mortality reduction of 39% between 1999 and 2003. On the basis of reports from countries with continued indigenous measles virus transmission, future control strategies as well as advantages and potential drawbacks of global measles eradication were discussed. Similarly the burden of rubella and congenital rubella syndrome (CRS) as well as the cost-effectiveness of rubella vaccination was assessed using different methods in several countries without vaccination programs. As measles and rubella viruses continue to circulate surveillance and control strategies need further optimization. RT-PCR was considered as an alternative method for laboratory diagnosis of CRS. The value of dried blood spots and oral fluid as alternative samples for measles and rubella IgG and IgM detection and genotype determination was evaluated. However further validation of these methods in different settings is required before their routine use can be recommended.

Keywords: Dried blood spots; Oral fluid; Congenital rubella syndrome

1. Introduction

A world-wide vaccination campaign coordinated by the World Health Organization led to the eradication of smallpox with a last case in October 1977. Despite recurrent set-backs poliomyelitis is also well on the way to elimination. The transmission of indigenous measles virus (MV) has been interrupted in the Americas, and in many other countries where outbreaks result solely from imported cases. Recently, tremendous progress was made in Africa and Asia to further reduce measles-related mortality. The burden of congenital rubella has been largely underestimated in developing countries [1], but WHO initiatives have renewed interest in this debilitating condition [2–4]. In order to improve laboratory surveillance for measles and rubella, WHO has set up a world-wide Laboratory Network for Measles and Rubella [5]. In April 2005, the WHO Steering Committee on Research related to Measles and Rubella Vaccines met in New Delhi for its annual meeting to review and evaluate progress towards global control of these two diseases.

2. Measles

2.1. Public health significance of measles

WHO estimates that measles is responsible for 4% of the 6 million annual deaths in children under-five. Ninety-eight percent of these deaths occur in developing countries [6]. Thus, despite progress in global control, measles continues to be a serious condition and a leading cause of childhood death, particularly in developing countries. In 2004, WHO reported an estimated 76% coverage of measles containing vaccines (MCV) world-wide and 51% of countries reached ≥90% MCV coverage in all districts [7]. Most countries have provided a second opportunity for measles vaccination, either by introducing a routine two-dose schedule or by mass cam-

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paigns. With 30 million estimated annual cases [8], most of them unvaccinated, MCV is still under-utilized.

2.2. Progress in reducing measles mortality

In 2001, WHO and UNICEF developed a 5-year strategic plan to reduce measles global mortality by 50% in the year 2005, compared to 1999 levels [9]. In regions with established measles elimination goals, the objective was to achieve and maintain interruption of indigenous measles transmission. The plan targeted 45 priority countries with the following major strategies: (i) high routine vaccination coverage (≥90%) in every district; (ii) providing a second opportunity for measles immunization, mostly through supplementary immunization campaigns; (iii) improving surveillance; (iv) improving case management including vitamin A supplementation and antibiotic treatment if needed.

Global vaccination coverage increased from 71% in 1999 to 76% in 2004, but Africa and Southeast Asia lag behind with an increase from 50 to 66% and from 59 to 63%, respectively. In 2004, only nine of the 45 target countries offered no second opportunity for measles vaccination. In 2003, global measles mortality was estimated at 530.000 deaths, a 39% reduction from 1999 (Fig. 1). Indirect indicators suggested that the largest reduction in mortality was achieved in the WHO African Region [10], largely by implementing the above 4 components of the WHO–UNICEF strategy. Otten et al. [11] reported a decline in annual measles deaths of about 20% (90,043 of 454,000) as a result of supplementary immunization activities (SIA) in 19 African countries between 2000 and 2003.

2.3. Progress in eliminating indigenous measles transmission

Enormous progress towards measles elimination has been made in the Americas. In 1994, a goal was set to eliminate indigenous measles from the Western Hemisphere by 2000 [12]. Numbers of cases rapidly declined from 1990 to 1996. One year later, a large outbreak started in São Paulo, Brazil and spread to Argentina and Bolivia. Major vaccination efforts led by these countries reduced numbers of cases reported in the region to 1754 and 537 cases by 2000 and 2001, respectively. Few countries had continuing virus transmission [13] and not a single child has died from measles during the last 3 years. Molecular tools demonstrated that endemic measles transmission has been interrupted, but cases imported from other regions and residents who become infected abroad continue to be a problem [14,15]. These achievements were only possible thanks to the strong commitment from health authorities to implement and sustain the above components of measles control.

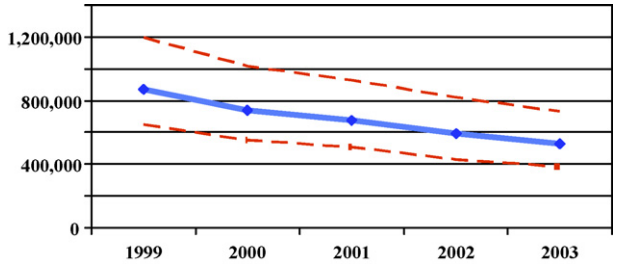

Fig. 1. Trends in estimated numbers of annual global measles deaths with uncertainty levels 1999–2003. Provisional data for 2003. Source: World Health Organization [59].

In the European Region and other countries, such as Australia, Mongolia, New Zealand, Philippines, the Pacific Island Nations and the Arab Gulf States, measles transmission has been interrupted or is at very low levels [16]. Also other regions have set elimination goals: the WHO European Region by 2007 and the Eastern Mediterranean Region by 2010. The Western Pacific Region plans to eliminate measles by 2012 [17].

2.4. Countries with indigenous measles transmission

Large countries, such as *Nigeria, India and Pakistan* continue to sustain large numbers of measles-related deaths (Dr. B.S. Hersh). In 2003, for instance, India reported more than 47,000 measles cases, while the 115 measles-related deaths are likely to be an underestimate. The country has used monovalent measles vaccine at 9 months of age since 1986; MMR is used only in the private sector. Reported coverage has been consistently high (>80%), but the estimated coverage is much lower (40–70%), and varies between states.

Other areas, such as *Niger* still report large outbreaks (Dr. C. Dubray). From November 2003 to June 2004, 11,073 cases were reported. Seventy-five percent of cases and 86% of deaths occurred in children under five. Attack rates were highest among the 6–9 month olds. Overall the case fatality rate (CFR) was 1.8%. CFR among under-fives and 12–35 month olds was as high as 2.7 and 4.6%, respectively. CFR was much higher (20%) among those admitted to hospital. The most prevalent complications were pneumonia (66%) and diarrhea (61%) followed by ear discharge (12.4%). This large outbreak was due to a failure to vaccinate, poor surveillance and an underestimation of CFR. In December following the outbreak, 94% of 9 months to 14-year-old children were vaccinated during a nationwide SIA. In the long term, routine vaccination coverage must be improved and a second opportunity for vaccination provided.

In *Nepal*, Dr. A. Joshi et al. conducted a community-based, retrospective study of a national, representative sample of 37 measles outbreaks (as defined by five or more epidemiologically linked measles cases) that occurred between March and August 2004 and were reported by health institutions throughout Nepal. Five thousand three hundred three measles cases with a median age of 6.4 years were reported; 25 and 60% of cases were 1–4 years and 5–15 years old, respectively. The crude CFR was 1.4%. The CFR was 8.9% for children <1 year, 2.9% for children 1–4 years, 0.5% for children 5–14