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ORIGINAL ARTICLE

Surveillance and Control of Rubella in the Republic of Korea From 2001 to 2009: The Necessity for Enhanced Surveillance to Monitor Congenital Rubella Syndrome

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Abstract
Objectives
The aim of this study was to review the epidemiologic data of rubella and congenital rubella syndrome (CRS) supplied by surveillance systems from 2001 to 2009 and to propose measures to improve the quality of the surveillance system in the Republic of Korea.
Methods
The epidemiological data for rubella and CRS cases reported to the Korea Centers for Disease Control and Prevention from 2001 to 2009 were retrospectively reviewed, and insurance reimbursement data from the Korea National Health Insurance Review Agency were collected for comparison.
Results
The number of yearly reported rubella cases to the Korea Centers for Disease Control and Prevention from 2001 to 2009 was 128, 24, 8, 24, 15, 12, 35, 30, and 36, respectively. The occurrence of rubella shifted to a slightly higher age group during the 9-year period, i.e. from 0–9 years to 10–19 years. Among the 309 reported rubella cases, three were confirmed cases of CRS. In addition, according to data sourced from Health Insurance Review Agency, 24, 19, 19, 9, and 5 CRS cases were reported for medical insurance reimbursement from 2005 to 2009, respectively.
Conclusion
According to available surveillance data, the reported cases of rubella and CRS were not high, but a more detailed surveillance with emphasis on susceptible women of childbearing age is necessary for better monitoring and control of rubella and CRS in the Republic of Korea.

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1. Introduction

Rubella, a mild febrile viral exanthematous disease, is an important public health concern because of its association with congenital rubella syndrome (CRS), which can result in miscarriage, stillbirth, and multiple birth defects including deafness, blindness, heart disease, and mental retardation.[1] Although rubella itself is a well-controlled disease that is preventable through vaccination in some nations,[2,3] widespread epidemics of the disease and significant morbidity and mortality from CRS still exist in other parts of the world.[4,5]

Since its introduction in the 1960s, vaccination against rubella was a significant factor in the prevention of rubella and CRS. Two different strategies have been used to control rubella and CRS: in the United States, all infants from 12 to 15 months of age are vaccinated,[6] whereas in the United Kingdom, susceptible women of childbearing age are vaccinated.[7] Both strategies were partially successful, which prompted the strategies to be revised to include vaccination of both populations (i.e. 12−15-month-old infants and susceptible women of childbearing age) by means of a universal dual vaccination strategy.[8] On the other hand, a comprehensive two-dose measles-mumps-rubella (MMR) vaccination program along with national surveillance and high vaccination coverage, as implemented in Finland, has led to success in the elimination of rubella and CRS in that country.[9]

In the Republic of Korea, the vaccine for rubella was first introduced in a monovalent form in 1978 and became standard in 1982 when the MMR combination vaccine was introduced. The MMR vaccine was recommended for all infants aged 15 months, but the actual vaccine coverage rate was not known. In 1997, a second dose of MMR was added to the schedule for children aged 4−6 years, in addition to the dose received at 12−15 months. However, because of insufficient policies to promote the second-dose coverage, the two-dose MMR vaccine coverage rate was low at 39% in 2001[10] and thus resulted in a large nationwide outbreak of measles in 2000−2001.

Before 2000, when the Prevention of Contagious Diseases Act was implemented, the reported case of rubella in the Republic of Korea was rare, and only a minor outbreak in Seoul in 1963 was recorded.[11] In the mid-1990s, a rubella outbreak among the adolescent population led to a change in policy from universal vaccination of infants to selective vaccination of all adolescent girls in tenth grade of high school.[12] Before the institution of vaccination to adolescent girls, a cost-benefit analysis study has revealed that both rubella vaccination policies were found to be cost-effective, but vaccination to adolescent girls were more effective than vaccination to infants of both sexes.[12] However, a large outbreak of measles in 2000 and 2001 prompted the government to implement a Five-Year Measles Elimination Program, which involved a nationwide measles-rubella catch-up vaccination program targeting the population aged from 8 to 16 years.[10] This campaign eliminated the selective vaccination program that targeted adolescent females, and a universal vaccination of all infants from 12 to 15 months of age and children from 4 to 6 years of age was implemented.[13]

Meanwhile, a surveillance system for rubella and CRS in conjunction with nine other vaccine-preventable diseases (i.e. diphtheria, pertussis, tetanus, measles, mumps, polio, hepatitis B, Japanese encephalitis, and chickenpox) has been implemented since 2001, and all cases of suspected rubella are requested to be reported immediately to the Korea Centers for Disease Control and Prevention (KCDC).

The World Health Organization (WHO) has recommended that countries that implement the rubella vaccine should conduct surveillance for rubella and CRS as a part of the measles surveillance system.[14] The minimum requirements for the surveillance system include monthly routine reporting of suspected CRS cases with zero reporting, monthly routine reporting of suspected rubella cases, investigation of all febrile rash illnesses in pregnant women, and testing for rubella-specific immunoglobulin M (IgM) antibodies in any suspected rubella outbreaks.[15] Recently, the Republic of Korea has experienced a series of measles outbreaks, which prompted attention to improve the surveillance system for measles. In conjunction with measles, the need to re-evaluate the surveillance for monitoring rubella and CRS has been raised. The aim of this study was to review the reported cases of rubella and CRS supplied by the surveillance system from 2001 to 2009 and to propose measures to improve the quality of the surveillance system in the Republic of Korea.

2. Methods

The epidemiological data for rubella and CRS cases under the Prevention of Contagious Diseases Act[16] were reported to the KCDC from 2001 to 2009. A suspected rubella case was defined as any patient presenting clinical symptoms of rubella; a confirmed rubella case was defined as any patient presenting clinical symptoms of rubella with laboratory confirmation [i.e. a positive blood test for rubella-specific IgM, 4-fold increase in immunoglobulin G (IgG) in paired serum samples, or virus isolation]. A suspected CRS case was defined as any infant with clinical symptoms of CRS; a confirmed CRS case was defined as any infant in whom clinical symptoms of CRS were presented with laboratory confirmation (i.e. the presence of positive rubella-specific IgM or isolation of virus).[17] For each case, a thorough investigation by an epidemic intelligence service officer was provided, including recording the