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Prevaccination screening of health-care workers for immunity to measles, rubella, mumps, and varicella in a developing country: What do we save?☆

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Summary A structured questionnaire was administered to health-care workers (HCWs). The HCWs were also screened for measles, rubella, mumps, and varicella (MMRV) using serological methods. One thousand two hundred and fifty-five HCWs were tested. Of the HCWs examined, 94% were immune to measles, 97% to rubella, 90% to mumps and 98% to varicella. The positive predictive values of histories of measles, mumps, rubella and varicella were 96%, 93%, 100% and 98%, respectively. The negative predictive values of histories of measles, mumps, rubella and varicella were 13%, 17%, 5% and 2%, respectively. The cost of vaccination without screening was significantly more expensive (cost difference: €24,385) for varicella, although vaccination without screening was cheap (cost difference: €5693) for MMR. Although the use of cheaper vaccines supports the implementation of vaccination programs without screening, the cost of vaccination should not be calculated based only on the direct costs. The indirect costs associated with lost work time due to vaccination and its side effects and the direct costs of potential side effects should be considered.

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However, if prescreening is not conducted, some HCWs (2—7%) would be unprotected against these contagious illnesses because of the unreliability of their MMRV history. In conclusion, the screening of HCWs before vaccination continues to be advisable.

Introduction

Measles, rubella, mumps, and varicella (MMRV) are highly contagious diseases, and pose a great risk to health-care workers (HCWs). Immunity to MMRV is an important part of infection control among HCWs, both for their own health and for the health of patients. The Centers for Disease Control and Prevention (CDC) strongly recommends the immunization of HCWs against MMRV infections. Pre-vaccination screening or mass vaccination can be implemented according to the cost-effectiveness analysis for each healthcare facility [1]. Most studies have demonstrated that serological screening before vaccination is cost effective [2—4].

However, cheap vaccines are now produced in India, and these vaccines are now being supplied by the Turkish Government's Ministry of Health. The recommendation to vaccinate HCWs without prescreening depends on their MMRV history. In this study, we aimed to evaluate the cost effectiveness and benefit of the prevaccination screening of HCWs for immunity to MMRV provided privately or by the government's Ministry of Health.

Materials and methods

Institution

This study was conducted at the Erciyes University Hospital, a referral, tertiary hospital with 1300 beds in the Central Anatolian region of Turkey. In 2010, this hospital had 758 nurses, 406 patient care staff members and 368 cleaning staff members. An Infection Control Committee was established in 1997, and a training program concerning health-care workers' health and immunization has been in place since 2000. However, a national vaccination program providing MMRV vaccinations for HCWs was not established by the Ministry of Health until January 2011. Prior to 2011, HCWs were vaccinated privately.

Study design

A structured questionnaire, including data on age, gender, number of siblings, childhood residence location, profession, department, length of employment, history of MMRV infections and status of MMRV vaccinations, was administered to HCWs between December 2010 and April 2011. The hematology, oncology, infectious diseases, and pediatric departments; the bone marrow transplantation unit; and the laboratories were defined as areas of risk [4]. Serological screening for MMRV was performed on HCWs using an enzyme-linked immunosorbent assay (EIA-EUROIMMUN®-Germany). The cost of each MMR test was €2.5, and the cost of each varicella test was €5. The MMR® (supplied by the Ministry of Health from the Serum Institute of India for €2.5) and Varilrix® (Glaxo-SmithKline, the cheapest commercially available, at €25) vaccines were used for the cost analysis. In a cost-effectiveness analysis, only the cost of the EIA and vaccines were included. Other direct and indirect medical or non-medical costs could not be evaluated. Because the CDC recommends two doses of vaccine for HCWs, the total vaccination price was calculated for two doses.

Statistical analysis

Data were analyzed using SPSS version 15.0 (Chicago, IL, USA). Univariate and multiple binary backward logistic regression analyses were used to investigate the factors related to the immunity of HCWs. A p-value <0.05 was considered significant.

Results

This study included 1255 HCWs, of whom 611 (49%) were nurses, 336 (27%) were cleaning staff, 241 (19%) were patient care staff and 67 (5%) were other staff. Of these, 798 (64%) were female. The ages ranged from 19 to 60 years (median 30). The median length of employment was 5 years ($\leq$1—47 years).