

**Brief Report**

## Measles among Healthcare Workers in a Teaching Hospital in Central Italy

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**Abstract: Measles among Healthcare Workers in a Teaching Hospital in Central Italy: Barbadoro PAMELA, et al. Department of Biomedical Science and Public Health, Section of Hygiene, Public Health and Preventive Medicine, Università Politecnica delle Marche, Italy—Objectives:** The aim of this report is to describe a measles cluster involving health-care workers (HCWs) that occurred in a teaching hospital in central Italy during winter 2011 and the efforts made to promptly identify all the susceptible contacts in order to stop, as soon as possible, transmission of the infection within the hospital. **Methods:** An epidemiological investigation took place. The immunization status of all the exposed individuals was assessed by personal interviews (history of measles or measles vaccine). Serologic screening for personnel not immune to measles was performed. **Results:** Four cases of measles infection in HCWs were identified; of the 72 HCWs tested for measles immunity, 50 reported a past history of measles, while 22 underwent serological screening, which showed that all were IgG positive except for one case, which was excluded from duty as recommended. Strict adherence to use of alcohol-based hand rub and rapid implementation of appropriate isolation precautions are essential but insufficient to prevent measles outbreaks in hospital settings. Vaccination is the only reliable protection against nosocomial spread of measles. Therefore, assessing the immunization status of HCW and implementing vaccination

strategies are needed in order to virtually set to zero the risk of acquiring and spreading measles in health-care settings.

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**Key words:** Healthcareworkers, Measles, Nosocomial transmission

Despite the availability of an effective vaccination, measles is reemerging in Europe. According to the European Centre for Disease Prevention and Control (ECDC) surveillance reports<sup>1</sup>, more than 30,000 measles cases were reported in 2010, representing a fivefold increase compared with the annual average for the preceding five years. During the first nine months of 2011, more than 29,100 cases were reported from European countries; no new measles outbreaks were reported during September, and transmission has continued to slow down in the second half of the year. France, Romania, Switzerland, Spain, Belgium, Denmark, UK and Italy are among the countries reporting a considerable increase in case numbers during 2011 compared with 2010.

Data from the Italian Ministry of Health<sup>2</sup> showed that in Italy, the mean coverage for the first dose of Measles Mumps and Rubella (MMR) vaccine in children below two years of age was 89.9% in 2009, ranging from 70.8 to 95.5% in the 21 regions of the country. In particular, in the Marches Region MMR coverage ranged between 80% in 2000 and 93.2% in 2008; in 2009 it was 92.4%. Global national data about immunization coverage are lacking in the adult population. However, a few seroprevalence studies have been performed in health-care workers (HCWs), and the results showed different values of measles seropositivity but still higher than 90%<sup>3</sup>. Measles among HCW accounts for a small proportion of the reported cases but is important because of the poten-

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tial of transmission of the disease to susceptible colleagues, high-risk patients and family members<sup>4</sup>. The risk of acquiring measles in nonimmune HCW is estimated to be higher than in general population<sup>5</sup>. The recent literature reports many outbreak events characterized by nosocomial transmission of measles and subsequent infection of healthcare workers<sup>4,6,7</sup>. Moreover, in Italy, measles vaccination is not compulsory in HCW; from July 2009 to September 2010, a total of 2,151 cases occurred in Italy; among them 34 cases in 10 regions were healthcare workers, including physicians, nurses, medical students, student nurses and other hospital workers<sup>8</sup>.

The aim of this report is to describe a measles cluster involving HCWs and all the infection control measures used to limit the spread of the disease.

## Methods

The cluster developed in two different branches (the Pediatric Hospital and the General Hospital) of the same 900-bed teaching hospital located in different areas of Ancona city in central Italy; although physically separated, patients and personnel of the two branches may transfer from one to the other; however, each hospital has its own Emergency Department (ED).

A case of measles was defined as one that met the clinical case definition (clinical picture compatible with measles, i.e., a generalized rash lasting more than 3 days, a temperature  $\geq 38^{\circ}\text{C}$  and one or more of the following: cough, coryza, Koplik's spots, conjunctivitis)<sup>9</sup> and developed in an HCW of the teaching hospital during the study period (January – March 2011).

The immunization status of all the exposed individuals was assessed by personal interviews (history of measles or measles vaccine).

Serologic screening for personnel not immune to measles was performed. All the examination fees were paid by the National Healthcare Service.

## Results

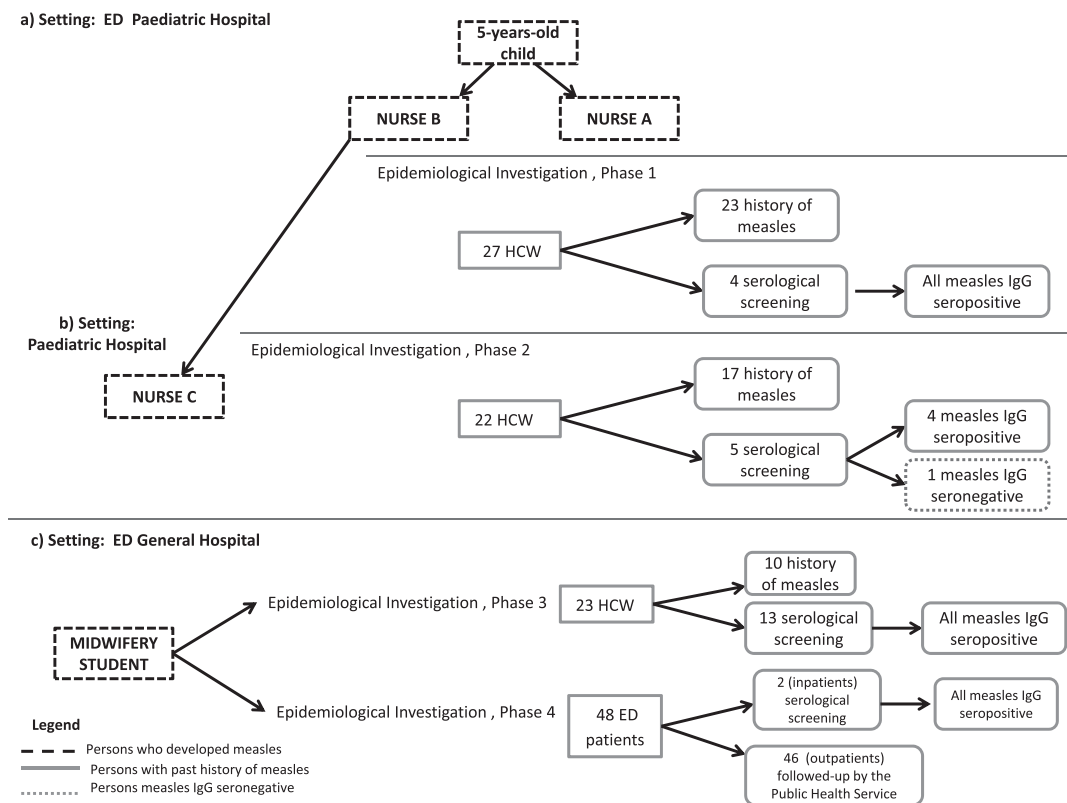
As detailed in Fig. 1, the cluster was started by a 5-year-old child presented to the ED of the Paediatric Hospital for assessment of high fever on 31 January 2011. The team who looked after the child consisted of 1 physician and 2 nurses (NURSE A and NURSE B). The child was immediately isolated because the pediatric emergency department staff, skilled in exanthematous disease, quickly realized that it could be a case of measles; so the child did not have any contact with the other patients in the ED waiting room. A few days later, on 8 February 2011, NURSE A presented with a fever  $\geq 38^{\circ}\text{C}$  and a generalized skin rash together with cough and coryza. He was diagnosed as having measles on a clinical basis. NURSE B

developed the same symptoms starting from 11 February with high fever and coryza, followed by the typical skin rash on 16 February. At this point, the Infection Control Team of the hospital, an organization always present in all the Italian hospitals by law, was alerted, and then an epidemiological investigation took place (Phase 1). This Infection Control Team usually deals with health-care-associated infection and may be referred to in case of a cluster of any infectious disease occurring in the hospital.

The management of susceptible contacts was achieved by early identification of all the HCWs exposed and assessment of their immunity status. Twenty-seven HCWs were interviewed: 23 (85%) reported that they had already contracted measles; the remaining 4 (15%) underwent serological screening, and they were IgG positive (Fig. 1, a). Nurse A and nurse B were both naïve to measles, while the physician reported a past history of measles.

On 26 February, NURSE C, who works at the Pediatric Hospital but not in the ED and who was not involved in the first phase of the epidemiological investigation, developed a high fever and cutaneous rash. At the anamnesis of previous contacts with known measles cases, she declared that she was NURSE B's wife; when the serological test was performed, she was IgG positive, and she reported that she had been previously vaccinated against measles. A new phase of the epidemiological investigation began (Phase 2); it involved 22 HCWs potentially exposed to measles infection. Among them, 17 (78%) reported a history of measles; 5 (22%) underwent serological testing. Four HCWs were IgG positive, while 1 was IgG negative. According to the international guidelines<sup>10</sup>, the HCW was excluded from duty from the fifth day after the first exposure until the 21st day after the last exposure to measles. Unfortunately, identification of this susceptible contact occurred more than 72 h after exposure, so administration of measles vaccine was not performed (Fig. 1, b).

On 27th February, a midwifery student training by the Pediatric Hospital came to the ED of the General Hospital for assessment of high temperature and rash. She stayed in the waiting room of the ED for about 2 hours. She was diagnosed with measles infection and hospitalized in the Infectious Disease ward. In this case, the epidemiological investigation involved two different populations (Phase 3 and 4): the midwifery student's colleagues at the Pediatric Hospital and the patients who were present in the ED waiting room together with her. Of the 23 HCWs involved, 10 (44%) reported a history of measles, while 13 (56%) were IgG positive after a serological test. Forty-eight patients were exposed to measles infection while staying in the ED waiting room of the General Hospital at



**Fig. 1.** Case series and epidemiological investigation phases according to the different settings; immunological assessment of HCWs involved.

the same time as the midwifery student. They were all identified, and the list was sent to the Hygiene and Public Health Service to undertake all the necessary control measures (Fig. 1, c).

Once the outbreak was confirmed and the epidemiological investigation begun, all the healthcare personnel was asked to collaborate, and an awareness campaign against measles diffusion was started. Besides those directly involved in the epidemiological investigation, the immune status of all the healthcare workers of the hospital was assessed by a questionnaire. The results of this survey showed that at the Pediatric Hospital, 57 HCWs (20.4% of those surveyed) declared that they were not immune to measles.

## Discussion

Here we describe 4 cases of measles infection in HCWs and the efforts made to promptly identify all the susceptible contacts in order to stop transmission of the infection within the hospital as soon as possible. Globally, of the 72 HCWs tested for measles immunity, 50 reported a past history of measles, while 22 underwent serological screening, which showed that all were IgG positive except for one case, which was excluded from duty as recommended. Infected HCWs

may transmit measles to susceptible colleagues, family members and patients who may belong to high-risk groups, such as children under 1 year of age, pregnant women and immunocompromised patients that are more likely to suffer severe complications<sup>4</sup>. Moreover, our findings underline the possible role of marriage between health-care professionals as a potential route of transmission of infection between different health-care settings.

Strategies to prevent nosocomial transmission of measles include documentation of measles immunity in health-care personnel, prompt identification and isolation of persons with a fever and rash and adherence to airborne precautions for suspected and proven cases of measles<sup>10</sup>. Strict adherence to alcohol-based hand rub and rapid implementation of appropriate isolation measures are essential but insufficient to prevent measles outbreaks in hospital settings<sup>10</sup>; in a recently published letter, the author wonders if there is the need for extra precautions to avoid nosocomial transmission of measles<sup>11</sup>. Vaccination is therefore the only reliable protection against nosocomial spread of measles<sup>7</sup>; health-care workers should have documented evidence of measles immunity, as they place themselves and patients at risk if they are not vaccinated against measles<sup>8</sup>. Moreover, the diagnosis of

measles in a previously vaccinated HCW highlights the need for an increased attention to effective serological protection and to modification of the measles virus.

Our findings of nosocomial transmission of a preventable contagious disease highlight the need to increase levels of immunity within HCWs. Higher awareness among health-care personnel, specific infection control precautions to prevent spread in hospital settings and implementing vaccination strategies for HCWs are needed in order to virtually set to zero the risk of acquiring and spreading measles in health-care settings.

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