

Case Study

Occupational Risk from Measles in Healthcare Personnel: A Case Report

Silvio TAFURI¹, Cinzia GERMINARIO¹, Marco ROLLO² and Rosa PRATO³

¹Department of Biomedical Sciences, Section of Hygiene, University of Bari, Apulia Regional Epidemiological Observatory, ²Infectious Disease Unit, SS. Annunziata Hospital and ³Department of Medical Sciences, Section of Hygiene, University of Foggia, Apulia Regional Epidemiological Observatory, Italy

Key words: Measles, Health workers, Biohazard

In 2006 and 2008 two different outbreaks of measles, both occurring during winter seasons, were reported in the region of Apulia in south-eastern Italy. The second of these epidemics involved both young adults and children younger than 13 mo, the latter being the age range established by the Regional Vaccination Schedule for the first dose of the measles, mumps, rubella (MMR) vaccine^{1,2}.

The present epidemiological pattern of measles in Apulia reflects the vaccination efforts conducted in Italy from 2003, when the implementation of the National Elimination Plan for Measles and Congenital Rubella started up. The Plan engaged all Italian Regions in an extra-ordinary effort to reach target coverage of 95% in children at 24 mo of age, to introduce a second MMR dose at 5–6 yr of age (target: 90% coverage by 2007), and to carry out a catch-up vaccination program making use of all the occasions of contact children had with the vaccination services, including a campaign aimed at inviting all children of school age in primary and lower secondary schools (up to 8th grade) who had not yet received the two recommended MMR vaccine doses³.

Measles is usually a mild non-life-threatening disease in otherwise healthy children, but it may be severe with complications in infants, adults and people with impaired immune systems. Since the target MMR coverage for the WHO European Region (>95% for both doses) has not yet been reached, there is still the risk of outbreaks in susceptible adult subjects, and this includes health care workers. In Italy the current trends for measles in fact

show an increase in the average age of infection.

The vaccination of susceptible healthcare personnel against measles is recommended because it protects both the employee from complications and the patient from infection.

In March, in an Apulian hospital, a case of measles was reported in a nurse, who worked in the Paediatric Unit where a child infected by measles had been hospitalized.

Case Report

On 8th March 2008 a 10-yr-old with measles was admitted to a Paediatric Unit, where a 39-yr-old nurse took care of her.

On 14th March, seven days after the first contact with the child, the nurse became unwell with a temperature >38°C, cough, rhinitis and conjunctivitis. On 19th March the nurse presented maculopapular rash on her face later extending to the rest of her body; the same day she was admitted to the Infectious Disease Unit.

At admission, examination revealed fever >38°C, hepatomegaly, diffused maculopapular rash and tender cervical lymphadenopathy. Pathological anamnesis revealed that the nurse had never been infected by measles or rubella and had never received the MMR vaccine.

On 20th March 2008 investigations revealed: a white cell count of 3,400 × ml, neutrophil leukocytosis of 84.1%, lymphopaenia of 10%, monocytes of 5.6%, basophils of 0.3%, eosinophil of 0%, and abnormal liver function tests showing sGOT (Serum Glutamic Oxaloacetic Transaminase) 251 IU/l (NR: ≤37 IU/l), sGPT (Serum Glutamic Pyruvic Transaminase) 169 IU/l (NR: ≤55 IU/l), γGT (Gamma-GT) 252 IU/l (NR: ≤55 IU/l), alkaline phosphatase 248 IU/l (NR: ≤117 U/l), Sedimentation Rate 33 mm/h (NR: 1–15 mm/h), and PCR 23,6 mg/l (NR: ≤3,5 mg/l). Seroprotein fraction values separated by electrophoresis and determination of Streptolysin Antibodies titre did not show pathological values.

Serodiagnosis according to Widal-Wright was negative; serum titres of IgM (Immunoglobulin M) antibodies to Epstein-Barr virus, citomegalovirus and rubella virus were not demonstrated, but high titres of IgG (Immunoglobulin G) were revealed.

Naso-pharyngeal swab, blood and urine cultures were negative; beta-haemolytic streptococci were not detected. With the progression of the rash, measles was considered. Elevated serum titres of IgG and IgM antibodies to measles virus were subsequently demonstrated. The diagnosis of measles was confirmed, and the patient improved over the next few days. On 24th March 2008 the nurse was discharged. The patient is now well.

No other case of measles was hospitalized in the same ward during March–April 2008.

Received Jul 29, 2008; Accepted Nov 6, 2008

Published online in *J-STAGE* Dec 19, 2008

Correspondence to: R. Prato, Department of Medical Sciences, Section of Hygiene, University of Foggia, Apulia Regional Epidemiological Observatory, Viale L. Pinto Ospedali Riuniti, Foggia 7110, Italy (e-mail: r.prato@unifg.it)

Discussion

During the last two years several outbreaks of measles have been reported in Europe. In these outbreaks healthcare personnel and medical students were involved^{4–6}.

In WHO guidelines for measles elimination, the present epidemiological pattern of measles in Italy is defined “phase II of measles control”: high vaccination coverage for one dose of MMR (90–95% <24 mo) has been reached and maintained, outbreaks are more deferred in time compared with the previous ones and involve older subjects⁷.

In 2003, when there was a large outbreak in Italy with 40,000 cases of measles reported⁸, a National Elimination Plan for Measles and Congenital Rubella was started. The Plan outlines an integrated approach to achieving both disease targets by 2010 through the implementation of the first vaccination of MMR at the age of 15 mo and the second vaccination to children at 5–6 yr old. A catch-up vaccination with two doses of the MMR vaccine has been added to the list of routine vaccinations for still-susceptible boys and girls at 11 to 12 yr of age⁹.

With the start of the National Elimination Plan for Measles and Congenital Rubella in Apulia, vaccination coverage for MMR in children aged <24 mo increased from 84.4% recorded in the 2001 birth cohort to 92% in the 2005 birth cohort. Vaccination coverage in the 1991–1997 birth cohort, target of the catch-up vaccination strategy, was 70.9% for one dose and 49.8% for two doses. The target MMR coverage for the WHO European Region (>95% for both doses) has not yet been reached.

The vaccination of susceptible healthcare personnel against measles, mumps and rubella is recommended because it protects both the employee from complications and the patient from infection¹⁰. In fulfilment of such obligations the National Vaccination Plan of 2005/2007 recommends that all susceptible health care workers should be offered the MMR vaccine¹¹.

This recommendation is part of the workers' health safeguard regulations and is part of the strategy aimed at the prevention of infections related to health care. In fact, there is a risk of infection during incubation in potentially susceptible health workers, which is particularly worrying for patients with immunodeficiency; the death rate in cases of measles is 70% in oncological patients and 40% in seropositive patients¹². The rate of severe complications is equal to 80% in patients with immunodeficiency, much higher than in the general population¹³.

The responsibility of the screening of health operators susceptible to measles and rubella, the recommendation to vaccinate, and the administration of the MMR vaccination is entrusted, as specified by Italian Law 626/94, to occupational health physicians, who should operate

giving due priority to health care workers who assist those patients subject to risk of infection and susceptible to these diseases, for example personnel in paediatrics, emergency, and vaccination services¹⁴. However this occupational health activity is still not fully implemented, perhaps because the ability to prevent infection by measles and rubella is a recent achievement. Even more recent is the evidence of the possible role of these diseases in infection relating to health care itself. There is a strong need for updated training of doctors delegated to the safeguarding of health care workers.

Training should be made available to all health care professionals, particularly nurses who are at risk, first to guarantee that the correct facts are known about the occupational health risks and second to promote MMR vaccination compliance among susceptible personnel.

Recommendations should also extend to medical students who are too often poorly protected against and insufficiently warned about potential occupational exposure to pathogens and their dissemination to patients¹⁵. In fact, during the last winter season an important nosocomial cluster of measles occurred in Reims, France. The epidemic involved healthcare personnel: a 22-yr-old unvaccinated medical student and a non-immune 24-yr-old nursing student who was taking care of hospitalised children⁵.

The prevalence of measles in non-immune health care workers is low, but with a fall in the uptake of MMR immunization and the increased likelihood of measles outbreaks, it is important to identify these at-risk individuals. To achieve complete immunity, it is cost-effective to screen and then offer immunization¹⁶ as the World Health Organization states: “in some settings, medical personnel have been the source of measles spread. Policies requiring immunization or proof of immunization may need to be implemented”¹⁷. Moreover more awareness among health professionals of measles diagnosis, appropriate infection control practices to prevent transmission in hospital settings and specific vaccination recommendations for health professionals is needed^{18, 19}.

References

- 1) Prato R, Chironna M, Caputi G, et al. An outbreak of measles in Apulia, Italy, November 2006–January 2007. *Euro Surveill* 2007; 12: E070405.1
- 2) Caputi G, Tafuri S, Chironna M, et al. An outbreak of measles including nosocomial transmission in Apulia, south-east Italy, January–March 2008—a preliminary report. *Euro Surveill* 2008; 13: pii:18839.
- 3) Italian Ministry of Health. National Elimination Plan for Measles and Congenital Rubella 2003–2007. *Directory Acts* 2003 Nov 13; 1857 (in Italian).
- 4) World Health Organization. Field guidelines for measles elimination. Geneva (Switzerland): WHO; 2004. ISBN 92 9061 126.

- 5) Bégué P. Impact of vaccinations on the epidemiology of infective diseases *Bull Acad Natl Med* 2001; 185: 927–39; discussion 939–41.
- 6) Thierry S, Alsibai S, Parent du Châtelet I, on behalf of the Investigation Team. An outbreak of measles in Reims, eastern France, January–March 2008—a preliminary report. *Euro Surveill* 2008; 13: pii:8078.
- 7) Brostoff JM, Weir W, Roche S. An unusual case of fever and rash in an adult. *Eur J Intern Med* 2008; 19: 67–9.
- 8) Ciofi degli Atti ML, D’Argenio P, di Giorgio G, Grandori L, Filoni A. Measles in Italy 2002: studies show correlation between vaccine coverage and incidence. *Euro Surveill Weekly* 2002; 6: 021205.
- 9) Krause PJ, Gross PA, Barrett TL, Dellinger EP, Martone WJ, McGowan JE Jr, Sweet RL, Wenzel RP. Quality standard for assurance of measles immunity among health care workers. *The Infectious Diseases Society of America. Infect Control Hosp Epidemiol.* 1994;15:193–9.
- 10) Lewis RF, Braka F, Mbabazi W, Makumbi I, Kasasa S, Nanyunja M. Exposure of Ugandan health personnel to measles and rubella: evidence of the need for health worker vaccination. *Vaccine.* 2006 Nov 17; 24: 6924–9. Epub 2006 Jun 28.
- 11) Italian Ministry of Health. National Immunization Plan 2003–2005. *Italian Official Bulletin* 2005 Apr 14; 63 (in Italian).
- 12) Kaplan LJ, Daum RS, Smaron M, McCarthy CA. Severe measles in immunocompromised patients. *JAMA* 1992; 267: 1237–41.
- 13) Center for Disease Control (CDC). Measles—United States, 1990. *Morb Mortal Wkly Rep* 1991; 40: 369–72.
- 14) 626 Legislative Decree 1994 September 19. *Italian Official Bulletin* 1994 Nov 12; 265 (in Italian).
- 15) Gendrel D. Vaccines and exposed occupations. *Med Sci (Paris)* 2007; 23: 417–22.
- 16) Ziegler E, Roth C, Wreghitt T. Prevalence of measles susceptibility among health care workers in a UK hospital. Does the UK need to introduce a measles policy for its health care workers? *Occup Med (Lond)* 2003; 53: 398–402.
- 17) Centers for Disease Control (CDC). Measles, mumps, and rubella—vaccine use and strategies for elimination of measles, rubella, and congenital rubella syndrome and control of mumps: recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR Morb Mortal Wkly* 1998; 47: 1–57.
- 18) Weston KM, Dwyer DE, Ratnamohan M, et al. Nosocomial and community transmission of measles virus genotype D8 imported by a returning traveller from Nepal. *Commun Dis Intell* 2006; 30: 358–65.
- 19) Marshall TM, Hlatswayo D, Schoub B. Nosocomial outbreaks —a potential threat to the elimination of measles? *J Infect Dis* 2003; 187 (Suppl): S97–101.