

Measles in immunized medical residents: Case series with brief review

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ABSTRACT

Measles is a vaccine-preventable disease that continues to be a major cause of morbidity and mortality in children and young adults across the world. Immunization efforts have reduced the incidence of measles over the last 3 decades, but outbreaks are seen in high-transmission areas with susceptible populations, as is seen in hospitals and student campuses. The protection offered by prior vaccination may wear off over time making vaccinated individuals susceptible to infection. Hence, catch-up immunization drives should be undertaken for vulnerable populations such as healthcare personnel, along with routine immunization programs, with the goal to eliminate measles in the future. This case series presents measles in two of our medical residents who got infected despite being vaccinated in childhood.

Keywords: Adult measles, healthcare workers, immunization, measles eradication, measles resurgence

Introduction

Measles is a highly contagious disease caused by the Paramyxovirus group, and is perceived as a childhood viral exanthema. The universal immunization program, and the eventual reduction in the incidence of measles, has resulted in that clinicians are less suspicious of measles in adults. We report cases of two medical residents, posted in the general ward, with symptoms of fever and rash. Both the medical residents had a prior documented history of single-dose measles, mumps, and rubella (MMR) vaccination during childhood. Healthcare workers (HCWs) are susceptible to vaccine-preventable diseases (VPDs) such as measles, mumps, rubella, and varicella at the workplace. Measles in this vulnerable population threatens global efforts

to eliminate this disease. There is a need for a regular survey of immune status and vaccination of healthcare personnel against measles and other VPDs.

Case Report 1

A 25-year-old medical resident without significant past medical history, with a documented history of age-appropriate vaccination, presented with a history of intermittent low-grade fever for 5 days associated with chills and rigor. The patient also gave a history of erythematous, nonpruritic rash, which began from the face and progressed to involve the whole body. She also complained of odynophagia, dry cough, and multiple episodes of loose stools. There was no history of pain in the abdomen, vomiting, or dysuria. There was no manifest bleeding. The patient did not give any history of drug intake or travel. The patient was currently posted in the orthopedics ward, and denied a history of contact with any patient with fever and rash.

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On examination, the patient was febrile (101° Fahrenheit). Pulse rate was 100/min and blood pressure (BP) was 120/78 mmHg. The patient had diffuse erythema over the face with multiple erythematous papular lesions that were blanchable. Similar lesions were seen over the arms, abdomen, and legs. There was bilateral conjunctival and pharyngeal congestion along with cervical and submandibular lymphadenopathy. Oral ulcers were present but there were no Koplik's spots. The chest was clear. Dermatology referral was also sought. The patient was started on antipyretics, antihistaminics, and given adequate hydration.

On investigation for fever with a rash the following results were obtained: hemoglobin 12 g/dL, total leukocyte count $4 \times 10^9/L$, and platelet count $200 \times 10^9/L$. The peripheral smear showed a normocytic normochromic blood picture. The coagulation profile was normal. Antinuclear antibody (ANA) was negative; dengue nonstructural protein 1 antigen (NS1Ag), dengue immunoglobulin (IgM), chikungunya IgM, and malaria Ag tests were negative. HIV 1 and 2 and hepatitis B surface antigen (HBsAg) were negative. Rickettsial serology was negative. Rubella serology was negative. Typhoid IgM and Widal were inconclusive. Urine routine microscopy was normal. Blood culture was sterile. The biochemical profile including liver and kidney functions was normal. Chest radiograph and ultrasound (USG) abdomen were unremarkable. Measles IgM enzyme-linked immunosorbent assay (ELISA) was positive. The patient reaffirmed the prior single dose of childhood measles, mumps, and rubella (MMR) vaccination. She was diagnosed with adult measles, and managed in an isolation ward with appropriate precautions. She improved over 7 days with in-patient conservative management.

Case Report 2

A 23-year-old medical resident with a documented history of age-appropriate vaccination, presented with a history of fever with chills for 5 days. She also complained of throat pain and dry cough. There was also a history of rash all over the body, erythematous, associated with mild pruritis, for 2 days. There was no history of bleeding manifestation, dysuria, or joint pains. There were no abdominal symptoms. There was no history of travel, drug intake, or contact with any patient with a rash. Her past medical history was insignificant.

On examination, the pulse was 100/min, BP was 100/78 mmHg, and the temperature was 101° F. Mild pallor was present. There was bilateral nontender submandibular lymphadenopathy. The erythematous maculopapular rash was present on all four limbs, the trunk, and the face. Koplik's spots were seen on the hard palate opposite the upper second molar tooth. The pharyngeal wall was congested. Systemic examination was unremarkable.

Over 2 days, the fever spikes were higher, the rash worsened, and the patient also developed vomiting.

On investigation, hemoglobin was 11 g/dL, total leukocyte count was $6 \times 10^9/L$, and platelet count was $200 \times 10^9/L$. The

coagulation profile was normal. ANA was negative; dengue NS1Ag, dengue IgM, chikungunya IgM, and malaria Ag tests were negative. HIV 1 and 2 and HBsAg were negative. Rickettsial serology was negative. Rubella serology was negative. Typhoid IgM and Widal were inconclusive. Urine routine microscopy was normal. Blood culture was sterile. The biochemical profile including liver and kidney functions was normal. Chest radiograph and USG abdomen were unremarkable. Measles IgM ELISA was positive. Electrocardiogram (ECG) showed sinus tachycardia and ST-segment depression in V3-V6. The cardiac enzymes were normal. The patient was observed in a high-dependency unit (HDU). She was managed conservatively, and made a complete recovery in 10 days. She reaffirmed the prior single dose of childhood MMR vaccination.

Discussion

Presentation of fever with rash in adults has a wide differential diagnosis such as dengue, drug allergy, leptospirosis, typhoid, and infectious mononucleosis.^[1] Physicians should be aware that prior vaccination does not preclude a diagnosis of measles, and it should be included in the differential diagnosis of patients with symptoms of fever and rash.

Outbreaks of air-borne infections are common among HCWs due to a higher incidence of exposure. Levels of protection provided by childhood measles immunization may drop to baseline over a decade, and individuals may remain susceptible in high-risk setups. We have reported two cases of measles in immunized medical residents. A study done at Manipal University among health science students from 2008 to 2011 showed that overall susceptibility to measles, mumps, rubella, and varicella was very high, and that individuals remained vulnerable despite a history of immunization.^[2] Bajaj *et al*^[3] also reported a measles outbreak in 2014 in the Armed Forces Medical College campus among college students, 70% of whom had known vaccination status. A retrospective search for measles cases was undertaken in a hospital in Xinjiang Uighur Autonomous Region of the People's Republic of China between December 2015 and January 2016. Nineteen cases of measles among HCWs, aged 18 to 45 years, were identified among whom 16 had unknown vaccination status.^[4] In Italy, 322 cases of measles were reported among HCWs in 2017. A study to assess the measles immunization status showed that 26% of HCWs under the age of 30 were not protected against measles.^[5] Another survey to evaluate measles immunity status undertaken among 17,522 Australian HCWs in 2017 to 2018 identified a relatively high number (32.9%) of the surveyed HCWs who did not have the recommended evidence of measles immunity.^[6] A study from the Netherlands also highlighted that measles immunity among HCWs was suboptimal.^[7] In the above studies, protection against measles was defined by a documented history of having been twice vaccinated, or the presence of measles-specific IgG antibody titer >16.50 AU/mL.

Death caused by measles is as high as 10% in some parts

of the world.^[8] Deaths occur from complications such as pneumonitis, encephalitis, and superimposed bacterial infections. A full-vaccine course comprising two doses is thought to provide lifelong immunity and should be offered to children 1 year or older, or >6 months old during travel or community outbreak, and adults who are unvaccinated, have undocumented immunity or have received only one dose of the MMR vaccine.

Measles resurgence has been seen in close to a hundred countries since 2016.^[9] The resurgence may be due to a lack of vaccination, or an inadequate dosage of vaccination. Although most of the catch-up programs are aimed at children, there are no additional vaccination drives to cover susceptible populations, which include students in high-school and college, international travelers, and healthcare personnel. HCWs are at a much risk higher of acquiring measles in comparison with the general population. The *Advisory Committee on Immunization Practices (ACIP)* of the Centers for Disease Control and Prevention (CDC) recommends that HCWs should be vaccinated against or have documented immunity to hepatitis B, influenza, MMR, and varicella.^[10]

Conclusion

The resurgence of measles is a public health concern. Healthcare workers are at an increased risk of exposure to and acquiring measles. The immunity of healthcare workers to vaccine-preventable diseases should be registered at the time of recruitment or regularly surveyed by serological testing to identify susceptible individuals. Through this paper, we propose that the primary care physician in India also ensures the implementation of measles prevention strategies at their workplace, by identifying and introducing vaccination of susceptible or unprotected HCWs. This will be an important step toward complementing national efforts to prevent and control vaccine-preventable diseases.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given their consent for their images and other clinical information to be reported in the journal. The patients understand that their names and initials

will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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