

A POTENTIAL OUTBREAK OF MEASLES AND CHICKENPOX AMONG HEALTHCARE WORKERS IN A UNIVERSITY HOSPITAL.

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ARTICLE INFO

Article history:

Received 23 February 2019

Revised 17 March 2019

Accepted 23 March 2019

Keywords:

measles, chickenpox, healthcare workers, outbreak, vaccination.

ABSTRACT

In Italy there is currently a measles outbreak among the general population related to insufficient vaccine coverage. Despite the highest infectivity of some diseases, the guidelines released in the National Vaccination Plan recommend basic vaccination among HCWs.

In March 2018, one case of measles and one of chickenpox occurred among two young medical doctors who had come into contact with 153 people. We investigated, within 24 hours, the immunization status of close contacts, providing vaccinations for those not immune and isolation for people with premature signs/symptoms of infection. All patients analyzed (n=13) were immune. Among HCWs (n=140), 16 weren't immune for chickenpox and 7 for measles. All contacts that were not immunized were vaccinated within 72 hours, however, despite this, in one case we found antibody values that indicated a recent infection. The high contagiousness of measles led to a further case of illness among close contacts of the first young HCW infected, which could have been avoidable with the implementation of mandatory vaccination policies for all health care workers.

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1. Introduction

Healthcare workers (HCWs) are persons working in health-care settings, which are frequently exposed to patients and/or to infectious materials, including body substances, contaminated medical supplies and equipment, contaminated environmental surfaces, or contaminated air (1). They are at increased risk for acquisition of several vaccine preventable diseases and their vaccination is strongly recommended in order to protect them not only from occupational exposure but also from the spread of vaccine preventable diseases (VPDs) to susceptible patients and to their family (2-4).

Although the recent Italian vaccination law 119/2017 and Italian National Vaccination Plan 2017/2019, the decrease over the last years of vaccination coverage for measles in our country (especially among adolescents and young adults) contributed to a measles epidemic between January 2017 and December 2018.

Particularly, in 2018, 2.526 cases of measles (including 8 deaths) were reported in all the 20 Italian regions last year and approximately 44% of cases were reported in Sicily (with the higher incidence rate of 222 cases per million inhabitants). Moreover, 115 cases among healthcare workers were also reported (3,5,6). HCWs could spread the illness to susceptible patients and the risk of HCWs to contract measles is also 2 to 19 times higher than the general population (7).

In this scenario, a dangerous outbreak can occur in healthcare facilities and many cases were described in the international literature (8, 9). The "Guidelines for measles and rubella outbreak investigation and response" by the World Health Organization to contrast measles outbreaks, recommend an epidemiological investigation plan and an adequate communication program that requires: isolation of cases, contact management, immunization activities in response to an outbreak, advocacy and communication to ensure effective community involvement, public awareness, description of the outbreak and lessons learnt (10).

At the same time in Italy, between 2003 and 2008, an average of 100,000 cases of chickenpox were reported annually. Since 2009 there has been an important reduction in the number of cases, which fell to approximately 60,000/year. The incidence of illness decreased from 180 cases per 100,000 in 2003 to 99 cases per 100,000 in 2013 (11).

In this study, a nosocomial transmission of measles and chickenpox to two unvaccinated HCWs was reported. The investigation and response to the outbreak processes, to prevent the spread of the infection in hospital settings, were also described.

2. Material and methods

In March 2018, a clinical case of suspect measles and a case of chickenpox occurred among two young postgraduate medical doctors of the Anesthesiology department, which were promptly notified to the Local Health Unit (LHU).

The LHU proceeded to the serological confirmation of the two cases of illness and, in the second instance, to the identification of all the close contacts. The step by step process was applied to prevent the dissemination of the infections, as described by WHO. Within 24 hours, among close contacts, the immune status for chickenpox and measles was investigated through a blood sample analyzed for IgG and IgM, and people with signs or symptoms of infection were subject to isolation.

Detection was achieved using commercially available indirect enzyme-linked immunosorbent IgG and IgM assays (Technogenetics; automatic instrument Dinex DSX) and a qualitative antibody determination for MMR and chicken-pox viruses. IgG and IgM antibodies for measles and mumps viruses were categorized based on the index standard ratio (ISR) values as follows: seronegative (ISR: ≤ 0.90); indeterminate (ISR: $0.91-1.09$); and seropositive (ISR: ≥ 1.10). For rubella and chickenpox, values ≥ 10 IU and, respectively, ≥ 11 IU were considered seropositive.

Seronegative and indeterminate samples were retested with an equal number of randomly selected seropositive samples. Samples that initially tested indeterminate were categorized as seropositive if positive upon retesting; negative or indeterminate samples were categorized as negative for this study. Discordant results were rectified with an additional test; the final result was used.

3. Results

Case 2 (measles) reported the rash 3 days before the onset of othersymptoms such as general malaise, cough and diarrhea. The subject also continued working in health care settings at the same time, potentially infecting all the close contacts such as colleagues and patients (12).

Case B (chickenpox) occurred in another HCW of the same ward and he/she reported fever and general malaise, and only later a rash. In this case, the period of communicability extends from 1 to 2 days before the onset of rash until lesions have formed crusts (12).

Both HCWs had never been vaccinated and reported contacts with two infected relatives.

All close contacts of the two HCWs were linked to the hospital facilities and both worked in the same ward during the same days of infectivity. The hospital management compiled a list of contacts of the HCWs within 24 hours of notification, helping the surveillance team to take action.

Over the course of the infectivity period, these HCWs came into contact with 140 staff members and 13 patients. No relatives or friends of these patients were interested.

Although isolation and social distancing are important components of outbreak control, they should be used in combination with other measures, such as immunization.

In fact, according to international guidelines, contact prophylaxis depends on immunity status. Given that in our group there were no high-risk susceptible contacts (such as pregnant women, children less than 1 year old or immunocompromised subjects) normal human immunoglobulins were nor administered according to international guidelines. All the contacts of our sample were low-risk contacts (having a face-to-face contact or having spent 15 min or more in the same room with the case). Due to high virulence of measles and the large number of contacts of every HCWs, 140 HCWs were considered as close contacts and at particular risk for further transmission to general population.

Of the 140 HCWs screened, a negative serological status for chickenpox was detected in 16 HCWs and for measles in 7 HCWs. Other HCWs acquired the diseases in the past or they had been vaccinated. Not immune HCWs were vaccinated in the Hygiene and Preventive Medicine Unit of the University Hospital of Messina within 72 hours, but despite this, in one HCW antibody values that indicated a recent measles infection was reported, and the subject was isolated.

For all the 13 patients involved in close contact, a protective immunization status was detected.

Despite the virulence of the diseases, at the end of the outbreak, only five cases were detected (3 of measles and 2 of chickenpox, all recovered without complications).

In Figure 1 and in Figure 2 we reported the summary of measles and chickenpox cases diffusion and outbreak management.



Figure 1. Summary of measles cases observed and outbreak management.

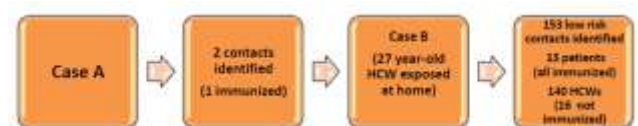


Figure 2. Summary of chickenpox cases observed and outbreak management.

4. Discussion

Our report describes cases of transmission of two vaccine preventable diseases within an health care setting, and the epidemiological management of the cases and close contacts potentially exposed.

In general, low vaccine coverages for measles and chickenpox were detected in Italy and at the University Hospital of Messina (13-16). This could represent a problem for the current measles epidemic occurring in Italy and Sicily (14).

Other measles outbreaks in hospital settings were also described in the literature (17). With regards to vaccination coverage among HCWs, in Italy several studies cover the subject. A multicenter study described that the vaccine coverage of HCWs in 10 different hospitals in 10 Italian cities was 30.3% (14.8% of the sample declare to have natural immunity) for measles and 16.4% (22.5% natural immunity) for chickenpox. At the Messina University hospital, the vaccine coverage was in line with the international trend. Also, other studies described the phenomena and the motivations of vaccine hesitancy among HCWs in Europe and in Sicily (13,18).

The international data underlines that evaluation and control of outbreaks of VPDs or other infectious diseases in healthcare settings is not cost effective and is dangerous for patients as well (19). The most effective public health strategy requires an early notification for identification of close contacts (20). Furthermore, it is important to achieve high levels of vaccine coverage in HCWs, not only for measles and chickenpox but for every VPD. Mandatory vaccination of HCWs could be a possible solution in order to achieve better coverage, like those that will be implemented in other Italian regions (Emilia Romagna, Marche and Apulia) (21-23). These measures could contribute to contrasting vaccine hesitancy of HCWs (23-28). In other cases, also other measures were effective to achieve the objectives as bottom-up and top-down approaches (29-30). Establishing standardized policies for vaccination of healthcare personnel should be one of the most important challenges and priorities for Italian public health decision makers.

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