

## A Case Study on Novel H1N1

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**A** 51-year-old Caucasian man with a history of acute myeloid leukemia, W.H. is three years removed from an unrelated donor allogeneic stem cell transplantation. W.H. has a significant medication history of post-transplantation antibiotic usage, macrolide immunosuppressant (tacrolimus), steroids, and immunoglobulin G1k monoclonal antibody (infliximab) for chronic graft-versus-host disease (GVHD). He presented to the clinic complaining of rhinorrhea, which he attributed to seasonal allergies; chest discomfort with coughing; sinus pain; and congestion. The patient was febrile (38.6° C), but he denied hemoptysis or discolored sputum.

Diagnostic workup included a complete blood count with differential, peripheral, and central venous catheter blood cultures; urine culture; sensitivity; chest x-ray; chest and sinus computed tomography (CT) scan; cytomegalovirus antigenemia; stool for vancomycin-resistant *Enterococcus*; and a nasal wash. Pertinent laboratory results included a positive rapid antigen test for H1N1 (swine-like) virus, low hemoglobin (11.7 g/dl), hematocrit (33%), and platelet count (67,000 cells/mm<sup>3</sup>). W.H. had elevated segmented neutrophils (80%), creatinine (1.5 mg/dl), aspartate aminotransferase (89 IU/L), and alanine aminotransferase (63 IU/L). Chest x-ray, chest CT, and blood cultures were negative, but a sinus CT revealed trace sinus disease.

W.H. was transferred to a protective isolation floor and placed on strict respiratory isolation precautions secondary to a positive test for H1N1 virus. The infectious disease team was consulted because W.H. had a significant history of bacterial, viral, and fungal infections and had recently taken medications that suppressed his immune response (i.e., antivirals and corticosteroids). In addition, W.H.'s white blood cell count remained at low normal levels, often requiring subsequent injections of filgrastim to boost white blood cell production. W.H.

remained on low doses of tacrolimus as maintenance therapy after transplantation, which was titrated dependent on chronic GVHD activity and the need for steroidal intervention. W.H.'s suboptimum condition placed him in a vulnerable immunocompromised position of succumbing to attack by this virus.

Because of W.H.'s positive rapid antigen results, he was administered oseltamivir 75 mg orally twice daily for five days. Adjuvant antibiotics included a course of IV vancomycin for four days and IV cefepime for nine days, and he was discharged on prophylactic antibiotic and antifungal therapy including trimethoprim/sulfamethoxazole, moxifloxacin, and fluconazole.

Because of the similarity in symptoms between influenza A and novel H1N1, healthcare professionals must understand the importance of early detection and treatment in the immunocompromised patient population. In W.H.'s case, a long-standing history of chronic rhinosinusitis with clinical manifestations of rhinorrhea, sinus congestion, and a nonproductive cough can be easily confused with the initial H1N1 presentation.

W.H. spent a total of nine inpatient days for the treatment of H1N1. He remained clinically stable and has since been followed up by the infectious disease team to assess the need for any additional interventions for recurrent pneumonia. His use of steroids has been discontinued, and he remains on a low dose of tacrolimus. His GVHD remains quiescent. His wife and family have since received the H1N1 vaccination and, to date, no outbreaks have been noted within the family.

### What Is Novel H1N1?

In early 2009, a number of new and emerging cases of an unknown strain of influenza A were noted in Mexico. Very soon after, a significant number of people in the United States and Mexico began demonstrating what appeared to be common flu-like symptoms. Because

the signs and symptoms mimicked that of influenza A, several thousand deaths occurred because of a lack of detection of the emerging H1N1 virus and lack of appropriate treatment (Gaur et al., 2010). The spread of the virus quickly reached pandemic proportions, which eventually led to the recognition of novel H1N1 influenza (Casper, Englund, & Boeckh, 2009). The Centers for Disease Control and Prevention ([CDC], 2010) estimated that, from April 2009 to March 2010, 60 million people worldwide were infected with the H1N1 virus, 270,000 people were hospitalized, and 12,270 deaths were attributed to the virus (Kharfan-Dabaja et al., 2010).

The novel H1N1, or "swine flu" as it is commonly referred to by the public, earned its name initially because laboratory testing demonstrated direct links to some of the same genes found in North American swine. It was initially thought that contact between humans and pigs may have been the route of transmission by inhaled droplets. The CDC (2010) has since reported that the swine flu is less common in North American swine and more prevalent in swine in Europe and Asia.

### Early Detection

In W.H.'s case, a long-standing history of chronic rhinosinusitis with clinical manifestations of runny nose, sinus congestion, and unproductive cough can be easily confused with the initial H1N1 presentation. Early detection with either a nasopharyngeal wash or a viral throat swab should be conducted and sent for rapid antigen testing (Crawford, 2009). These tests usually yield results within a few hours, depending on the institution or laboratory. Respiratory viral infections in the stem cell transplantation population can have high mortality rates (approaching 96%), particularly when copathogens exist and the viral respiratory infection lasts longer than three months (Kharfan-Dabaja et al., 2010). Optimal management of the H1N1 virus depends on early detection. This can be