

Researchers find new patterns in H1N1 deaths

December 23 2009

Brazilian researchers have performed the first-ever autopsy study to examine the precise causes of death in victims of the H1N1 swine flu.

"The lack of information on the pathophysiology of this novel disease is a limitation that prevents better clinical management and hinders the development of a therapeutic strategy," said lead author, Thais Mauad, M.D., Ph.D., associate professor of the Department of Pathology at São Paulo University, in Brazil.

The results of their study will be published in the January 1 issue of the American Thoracic Society's [American Journal of Respiratory and Critical Care Medicine](#).

The researchers examined 21 patients who had died in São Paulo with confirmed H1N1 infection in July and August, 2009. Most were between the ages of 30 and 59. They found that three-quarters (76 percent) of the patients had underlying medical conditions such as heart disease or cancer, but there was no clear complicating medical condition in the remaining quarter. All presented a progressive and rapidly fatal form of the disease.

While previous data has shown that most patients with a non-fatal infection have fever, cough and achiness (myalgia), Dr. Mauad noted that "most patients with a fatal form of the disease presented with difficulty breathing ([dyspnea](#)), with fever and myalgia being less frequently present."

All patients died of severe acute lung injury, but there were three distinct patterns of the damage to their lungs, indicating that the infection killed in distinct ways. "All patients have a picture of acute lung injury," said Dr. Mauad. "In some patients this is the predominant pattern; in others, acute lung injury is associated with necrotizing [bronchiolitis](#) (NB); and in others there is a hemorrhagic pattern."

"Patients with NB are more likely to have a bacterial co-infection. Patients with [heart disease](#) and cancer are more likely to have a hemorrhagic condition in their lungs. It is important to bear in mind that patients with underlying medical conditions must be adequately monitored, since they are at greater risk of developing a severe H1N1 infection," said Dr. Mauad. In these patients, H1N1 infection may present as a potential fatal disease, requiring early and prompt intensive care management, including protective ventilation strategies and adequate hemodynamic management. "We found that 38 percent of these patients had a bacterial infection (bronchopneumonia). This has important consequences because these patients need to receive antibiotic therapy, in addition to antiviral therapy."

The researchers also found evidence of an influenza-associated "cytokine storm," an aberrant immune response in the lungs of certain individuals, which was almost certainly involved in the pathogenesis in these fatal cases of the H1N1 infection. "[This] suggests that an overly vigorous host inflammatory response triggered by the viral infection may spill over to and damage lung tissue, thereby causing [acute lung injury](#) and fatal respiratory failure," noted John Heffner, M.D., past president of the ATS.

Further research is needed to understand precisely how and why certain patients succumb to a fatal progression when infected with H1N1. While most patients experience a mild illness with no lasting effects, this research lays important groundwork for future efforts by defining the

histological patterns associated with a fatal infection.

"We would like to deepen our efforts into the understanding of the immune responses in cases of severe infection," said Dr. Mauad. "This could ultimately lead to new therapeutic approaches."

Provided by American Thoracic Society

Citation: Researchers find new patterns in H1N1 deaths (2009, December 23) retrieved 19 April 2024 from <https://medicalxpress.com/news/2009-12-patterns-h1n1-deaths.html>

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