## SS 04 CH-09 11:00

Outbreak of severe inhalation lung injury associated with humidifier disinfectants among healthy young females: airway-centered fibrosis shown as extensive centrilobular nodules

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**PURPOSE:** We report a case series of previously unknown, severe inhalation injury related to use of humidifier disinfectants among healthy young females.

MATERIALS AND METHODS: From February 2011 to April 2011, we encountered 15 previous healthy young females who developed respiratory failure of unknown etiology (incident cases, n = 15). It was revealed as progressive lung fibrosis associated with inhalation of vaporized disinfectants in humidifier users, by subsequent government-lead epidemiologic study. We retrospectively gathered more patients showed the same clinical and radiological features to incident cases via medical record search from 2005 to 2010 (prevalent cases, n = 18). A total of 33 patients were included (all females; mean age, 32.7) and they were divided into two groups: Group I (n = 12) required ICU care and Group II (n = 21) required brief hospitalization. Chest radiographs and CT images were evaluated in terms of pattern, distribution, extent of abnormality, presence of pneumomediastinum or pneumothorax and temporal changes of those abnormalities.

**RESULTS:** Sixteen patients (48.5%) were peripartum women and 8 patients (24.2%) had children of the same illness due to common exposure. The onset was around the end of the winter, February to March, in most cases (n = 24, 72.7%). Three patients (9.1%) underwent lung transplantation and 6 patients (18.2%) died of end-stage lung fibrosis. The predominant imaging feature was diffuse centrilobular nodules involving both lungs (n = 33; mean extent, 75.3%), which were correlated with necrotizing bronchiolitis with peribronchiolar fibrosis on patients' pathology. In Group I patients, diffuse ground glass opacity (n = 5; 41.2%) and pneumomediastinum (n = 6; 50%) often appeared on follow up, compared to Group II patients (n = 2; 7.1% and n = 1; 5.1%) (p = 0.0001 for both).

**CONCLUSION:** Here we report a case series of 33 patients with progressive lung fibrosis leading to severe illness or death associated with inhalation of humidifier disinfectants. Interpretation of the airway-centered pathophysiology from the charateristic imaging features gave a crucial role in diagnosis and management of these critically-ill patients of unknown inhalation injury.