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E-cigarette or Vaping Product Use Associated Lung Injury

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A Case of EVALI from Vaping Marijuana

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Introduction

E-cigarette use or "vaping" has become a popular alternative to cigarette smoking. As a result, the CDC noted a significant increase beginning in March 2019 of patients hospitalized with acute lung injury in the setting of recent e-cigarette use and classified this condition as E-cigarette or vaping product use associated lung injury (EVALI). As of February 18th 2020, there have been 2807 EVALI-related hospitalizations and 69 deaths reported to the CDC[1].

The clinical presentation for EVALI typically consists of lower respiratory tract and gastrointestinal symptoms. Treatment typically consists of glucorticoids and supportive care, although duration of treatment and clinical course is variable on a case-by-case basis. The exact pathophysiology for the lung injury has not been completely explained, but it is thought to be related to some specific toxins in the e-cigarettes including vitamin E acetate, THC, various hydrocarbons and some silicon-conjugated compounds.[2] A recent study from Wisconsin reported that even at four to five weeks after discharge there was residual diffusion abnormalities in the patients hospitalized for EVALI.[3]

Case Presentation

A 25 year old female presented with acute-onset chest pain and shortness of breath. She reported associated abdominal pain, nausea and diarrhea. Initial workup in the emergency department revealed tachycardia to 140bpm but she was afebrile. Laboratory workup revealed leukocytosis and a CT scan of the chest revealed multifocal pneumonia (Figure 1). While in the emergent department, although not hypoxic at rest she desaturated to 89% on room air with ambulation. She was started on ceftriaxone and azithromycin and was admitted to the general medical unit for community-acquired pneumonia.

On hospital day two she became more dyspneic and had progressive hypoxia, eventually saturating only 90% on six liters nasal cannula. At this time, upon taking further social history, it was discovered that she regularly vaped marijuana for anxiety, with the last use being six days prior to presentation. On hospital day three she was intubated for acute hypoxic respiratory failure, her antibiotics were escalated to vancomycin, cefepime and azithromycin and she was transferred to the ICU.

In the intensive care unit she was started on steroids for EVALI treatment, initially with methylprednisolone 1mg/kg IV daily. She required paralytics due to being asynchronous with the ventilator. On hospital day five she was proned to help with her oxygenation, and remained so for approximately thirty-six hours. On hospital day eight she was successfully extubated and on hospital day nine she was transferred to the GPU on one liter nasal cannula. She was discharged home on room air on hospital day ten and was prescribed a steroid taper to complete a total of thirteen days of treatment.

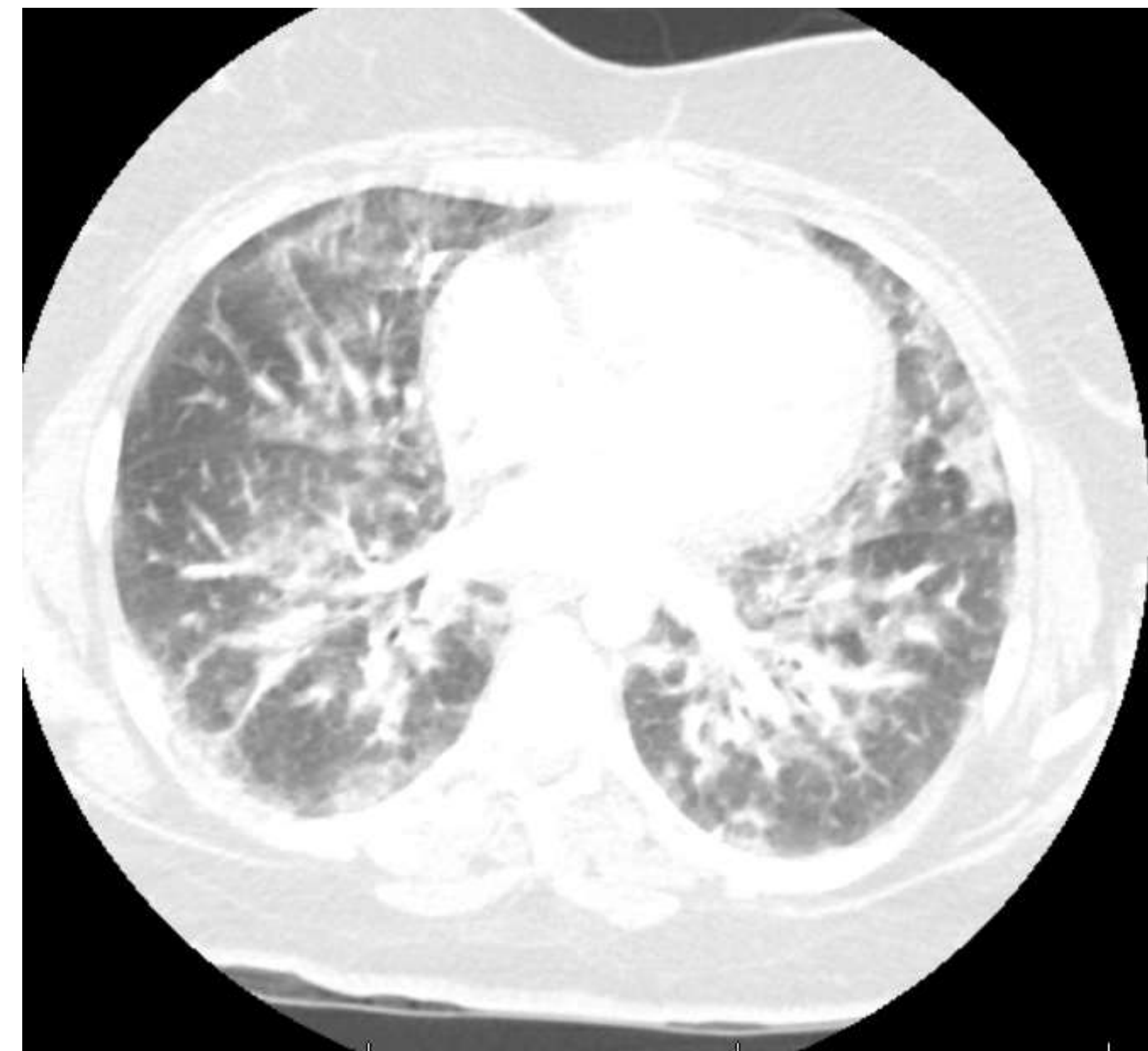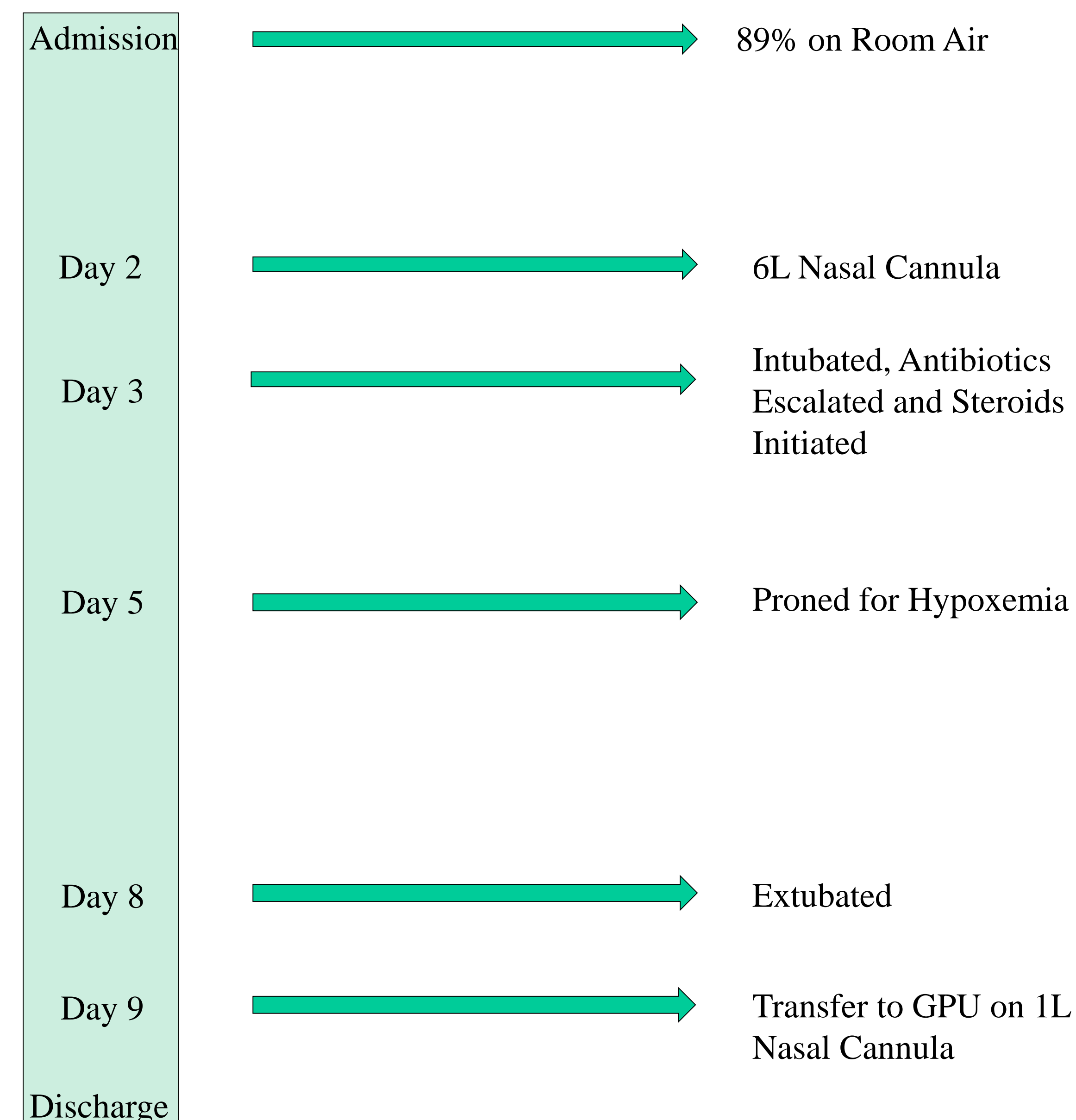## CT Chest with Contrast on Presentation

Figure 1. Radiology read: "Multifocal patchy groundglass and consolidative opacities in the lungs bilaterally"

Inpatient Timeline

Admission	89% on Room Air
Day 2	6L Nasal Cannula
Day 3	Intubated, Antibiotics Escalated and Steroids Initiated
Day 5	Proned for Hypoxemia
Day 8	Extubated
Day 9	Transfer to GPU on 1L Nasal Cannula
Discharge	

Discussion

As illustrated in this case, EVALI can be a very rapidly progressive and severe disease process. In one review of 60 patients who presented with EVALI, 55% were admitted to the intensive care unit.[4] Given the rapid progression and severity of the disease, establishing a way to detect and promptly treat EVALI is very important.

As a result of the increased incidence of EVALI, the CDC recommends anyone with signs of symptoms of a pulmonary illness be asked if they used an e-cigarette within the last 90 days.[5] Typical symptoms of EVALI include both shortness of breath as well as abdominal pain and diarrhea, as exhibited in our patient.

Inpatient management generally consists of glucorticoids and antibiotics to cover CAP. Duration of steroid treatment has not been definitively established. In this case, we see that after 5 days of glucocorticoids there was significant improvement in the patient's respiratory function, and within one week of steroid initiation she improved from ventilator-dependence to being discharged home on room air.

Take Home Points

1. Any patient presenting with a pulmonary illness should be asked about previous use of e-cigarettes or vaping
2. Gastrointestinal symptoms are common in EVALI
3. EVALI can be rapidly progressing, and initiation of glucocorticoids appears to be beneficial for severe illness manifestations
4. There may be downstream, permanent respiratory dysfunction as a result of EVALI

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