An Infectious Triple Play: Three Separate Infections in an Elderly Patient

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INTRODUCTION

Each year in the United States, there are over 700,000 healthcare-associated infections (HAIs). These infections include central line-associated bloodstream infections (CLABSI), catheter-associated urinary tract infections (CAUTI), surgical site infections, *Clostridium difficile* infections, and methicillin-resistant *Staphylococcus aureus* bloodstream infections.[1] While the Centers for Disease Control (CDC) reports an overall downward trend in all of these areas, HAIs continue to be significant sources of morbidity and mortality for hospitalized patients. In 2011, the CDC estimated about 75,000 patients with concurrent HAIs died during their admission.[1]

HAIs can be caused by a variety of different pathogens. Two of the more common HAIs include *C. difficile* and respiratory viruses. *C. difficile* is the most commonly reported HAI in the United States, with an estimated 450,000 cases in 2011.[2] Furthermore, nosocomial respiratory viral infections are underappreciated HAIs and causes of morbidity and mortality in hospitalized patients, with an estimated 15,000 adult cases yearly.[3] Despite prevention efforts among hospitals, HAIs continue to present problems for hospitalized patients. This case report highlights a patient with two HAIs during a relatively short hospitalization.

CASE REPORT

A 96-year-old woman presented from her assisted living facility with fever and chills. She had a baseline history of severe dementia, urinary incontinence, and hypertension. She was in her usual state of health until three days prior to admission. The patient was noticed to have pink-tinged urine in her brief. She went on to develop lethargy, fever, and chills. Given the concern for a urinary tract infection, the patient was sent to the hospital for further evaluation. She had no complaints of dysuria. She did not have any coughing, rhinorrhea, shortness of breath, abdominal pain, nausea, emesis, diarrhea, or lower extremity edema. She had not been hospitalized or used antibiotics in the last three months. Upon arrival to the emergency room, her vital signs were: 102.5 degrees Fahrenheit, blood pressure190/80, and heart rate over 100. Her physical exam was normal aside from her dementia.

Her urinalysis showed 3+ leukocyte esterase, 62 WBCs, and a positive nitrite level. Her rapid influenza PCR was negative for both Influenza A and B. Her white blood count was 15.5×10^9/L, with a differential of 85.4% neutrophils, 5.4% lymphocytes, 8.8% monocytes, 0.2% eosinophils, and 0.3% basophils. She was treated empirically with vancomycin and ceftriaxone for urinary tract infection with presumed systemic involvement and admitted to the hospital.

On hospital day two, her WBC increased to 22.4 $\times 10^9$/L. Her urine and blood culture grew *Escherichia coli* that showed no resistance to antibiotics. Vancomycin was discontinued. Her fever resolved. She had no dysuria, and her physical exam was at her baseline according to her family. By hospital day three, her leukocytosis resolved. A peripherally inserted central catheter line was placed in anticipation of discharging her to a skilled nursing facility to complete intravenous antibiotic treatment, but there was no bed available, and she continued her treatment of antibiotics in the hospital.

On hospital day six, her temperature spiked to 100.9 degrees Fahrenheit. Bilateral rhonchi were noted on her physical exam, and she developed an intermittent nonproductive cough. A new respiratory viral panel was positive for influenza B infection, and the patient was started on oseltamivir. The blood cultures showed no growth after five days.

On hospital day seven, her fever continued to increase to 103.2 degrees Fahrenheit. She had an episode of non-bloody, non-bilious vomiting with new tenderness in her lower abdominal quadrants. She had no guarding or rebound, and had normoactive bowel sounds. An abdominal x-ray showed no evidence of obstruction or free air; however, it did show signs suggestive of fecal loading in the rectum. The patient received an enema and manual disimpaction.

By hospital day eight, her WBC increased to 12.1 $\times 10^9$/L as she developed multiple episodes of watery, non-bloody diarrhea. Her antibiotics were expanded to include piperacillin-tazobactam to cover broadly for abdominal sources of infection. *C. difficile* toxin PCR was positive. Piperacillin-tazobactam was then discontinued, and she was started on oral metronidazole. She completed a five-day course of oseltamivir for influenza. By hospital day nine, the patient's vital signs normalized. She was afebrile and back to her clinical baseline. She continued her treatment for *C. difficile* and was transferred to a skilled nursing facility.

DISCUSSION

This case of a patient admitted to the hospital with *E. coli* bacteremia secondary to a urinary tract infection and two subsequent HAIs illustrates the ongoing need for policy aimed at reducing HAI. While her hospital stay was relatively short, her additional infections put her at greater risk for increased morbidity and mortality. Additionally, her length of stay in the hospital was prolonged due to HAI. Occam's razor encourages one to seek a single unifying diagnosis, but given her age, multiple comorbidities, and evolving clinical course, there was a need for keeping a broad differential and for maintaining an open mind toward new diagnoses. Using the frequency of five nosocomial viral infections per 10,000 adult admissions and the 61 *C. difficile* infections out of 11,282 patients, the probability of any patient acquiring both of these two nosocomial infections, assuming they are acquired independently of each other, would be less than 3 in 1,000,000.[3,4] This patient had advanced age and treatment with multiple antibiotics, which would increase her susceptibility. The diagnostic work-up could have stopped at either the respiratory viral panel or the *C. difficile* PCR, but doing so may have missed a potentially life-threatening infection.

References

1. CDC. HAI Data and Statistics | HAI | CDC. 2017; https://www.cdc.gov/hai/surveillance/index.html.
2. Lessa FC, Mu Y, Bamberg WM, et al. Burden of Clostridium difficile infection in the United States. *N Engl J Med.* 2015;372(9):825-834.
3. Chow EJ, LMermel LA. Hospital-Acquired Respiratory Viral Infections: Incidence, Morbidity, and Mortality in Pediatric and Adult Patients. *Open Forum Infectious Diseases.* 2017.
4. Magill SS, Edwards JR, Bamberg W, et al. Multistate point-prevalence survey of health care-associated infections. *N Engl J Med.* 2014;370(13):1198-1208.

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