



Case report

Unusual community-associated carbapenem-resistant *Acinetobacter baumannii* infection, Pennsylvania, USAMohamed H. Yassin^{a,*}, Tung Phan^b, Yohei Doi^a^a Division of Infectious Diseases, University of Pittsburgh, Pittsburgh, PA, USA^b Division of Clinical Microbiology, University of Pittsburgh and University of Pittsburgh Medical Center, Pittsburgh, PA, USA

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ABSTRACT

We report a rare case of community-acquired pneumonia and bacteremia caused by multidrug resistant *Acinetobacter baumannii*. The patient was critically ill, intubated for 11 days and subsequently was discharged from the hospital in good condition after 21 days. Whole genome sequencing was performed, and *Acinetobacter baumannii* isolate belonged to Sequence Type 451, which is prevalent in Asia. The case highlights the blurring margin between healthcare-associated and community-acquired infections.

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Introduction

Acinetobacter baumannii is a major cause of healthcare-associated infections worldwide [1]. Most of healthcare-associated infections are caused by an epidemic clonal lineage of multidrug-resistant *A. baumannii*, referred to as International Clone 2 (IC2) or Clonal Group 2 (CG2) [2]. This bacterium is also known to cause community-acquired infections in tropical and subtropical areas, including Southeast Asia and Northern Australia. However, community-acquired strains of *A. baumannii* are clonally variable and typically susceptible to many antimicrobials. Here we report a rare case of severe community-acquired pneumonia and bacteremia.

Case presentation

The patient was a 40-year-old female who presented with acute onset dyspnea and cough during her sleep. She had a personal medical history of mild asthma and anxiety. She was seen in the Emergency Department (ED) for minor issues on several occasions but was never admitted to the hospital prior to this incidence. The patient lived with her husband and children who had no known health issues and prior to hospitalization, she was working as a nurse assistant in a personal care home. She smoked half a pack of cigarettes daily but did not drink alcohol or use illicit drugs.

Upon her presentation to the ED, she had a fever of 38.4 °C, tachypnea with a respiratory rate of 40 per minute and oxygen saturation of 90 % on room air. However, she was alert and oriented. Auscultation of the chest revealed diffuse wheezing, and the rest of the physical examination was normal. A chest radiograph was performed and showed right lower lobe infiltrate. CT of the chest was significant for pneumonic infiltrate at the right base and small right-sided pleural effusion. Her white blood cell count was 19,900/μL with neutrophil predominance, and her lactic acid level was 4.3 mmol/L (normal 0.5–2.2 mmol/L). She was started on aztreonam and doxycycline intravenously after sputum and blood cultures were obtained due to reported allergies to cephalosporins and macrolides. However, she was transferred to the intensive care unit and placed on non-invasive positive pressure ventilation due to worsening hypoxia. Both her blood and sputum cultures revealed lactose-negative gram-negative bacteria that were finalized as *Acinetobacter baumannii* on hospital day 3. Antimicrobial susceptibility was performed, and the results were listed in Table 1. Her antibiotic treatment was changed to doripenem, colistin and tigecycline for 14 days. The patient required ventilatory support before her condition started to improve. Her respiratory status eventually improved, was extubated on hospital day 11 and was discharged home after 21 days in the hospital. The patient remained well as of six months after hospital discharge. The patient had a full recovery, and was back to her usual life as per a phone call after 9 months of discharge.

The *A. baumannii* isolate was subjected to whole genome sequencing by Illumina NextSeq using the standard paired-end protocol. Genomic analysis revealed that the isolate belonged to

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Table 1
Susceptibility of the *Acinetobacter baumannii* isolate.

Drug	MIC (mg/L)	MIC interpretation
Ampicillin sulbactam	>32	Resistant
Cefepime	>64	Resistant
Ciprofloxacin	>4	Resistant
Gentamicin	>16	Resistant
Meropenem	>16	Resistant
Minocycline	8	Intermediate
Tigecycline	0.5	No CLSI break points*

* CLSI = Clinical and Laboratory Standards Institute.

Sequence Type (ST) 451 as part of CG2, and ST-451 has been reported widely across Asia in association with multidrug resistance. The genome contained the *bla_{OXA-23}* gene accounting for carbapenem resistance, and the *armA* gene accounting for aminoglycoside resistance. The presence of amino acid substitutions in the quinolone resistance determining region (QRDR) (GyrA [S83 L] and ParC [S80 L]) explained resistance to fluoroquinolones [3]. Overall, the isolate possessed the typical features of multidrug-resistant CG2 strains that cause healthcare-associated infections.

Discussion

Community-associated pneumonia due to multidrug-resistant *A. baumannii* is extremely rare in countries with non-tropical climate, including the US [4,5]. The patient in this case was healthy and worked at a personal care home. While no epidemiologic link can be established, it is possible that she became colonized with the isolate at work when she encountered a recipient of the care who was colonized with this isolate. Even if this is the case, it represents an unusual case of carbapenem-resistant *A. baumannii* infection occurring outside conventional healthcare settings [6,7]. The healthcare is a continuous system of outpatient, inpatient and long-term care facilities. The virtual boundary between community-associated and healthcare-associated infections are likely to blur, as is highlighted by this case. The challenges in antibiotic management and infection prevention of *A. baumannii* as well as other gram-negative are likely to be observed in all healthcare aspects [8].

Author statement

It gives me a great pleasure to submit my case to the Journal of ID cases. I am excited about this case and I felt it is unique enough with multiple consideration for the public, infection prevention, infectious diseases and critical care. All authors had not conflict of interest pertaining to the case. There was no funding for this case report. The authors are faculty at the University of Pittsburgh and the testing was performed at the University lab with no additional cost. The case was never published or presented previously.

Declaration of Competing Interest

The authors declare no competing financial interests.

Availability of data and material

Not applicable

Ethical approval

Approval from the ethical committee was not required due to the nature of this case report. Abiding by the Declaration of Helsinki, patient anonymity was guaranteed.

Author contributions

MY and YD: designed the study; MY, TP and YD: performed experiments and wrote the manuscript.

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