An outbreak of carbapenem-resistant Acinetobacter baumannii in an isolation ward for COVID-19 and successful outbreak control with infection control measures

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Background

The superinfection of multidrug-resistant bacteria is an important complication in critically ill COVID-19 patients. *Acinetobacter baumannii* is one of the most problematic nosocomial pathogen that can contaminate the hospital environment because it is able to survive for prolonged periods on dry surface and resistant to common disinfectants. In particular, carbapenem-resistant *Acinetobacter baumannii* (CRAB) is reported up to 20% in some studies.

Even for COVID-19 patients who are mainly admitted to isolation rooms with strict precautions, an outbreak of CRAB occurred. We performed an outbreak investigation, and successfully controlled with the enhanced environmental cleaning and additional gowning and gloving.

Objectives

- To assess the epidemiology of patients with CRAB occurred in an isolation ward for COVID-19
- To identification of successful environmental disinfection methods

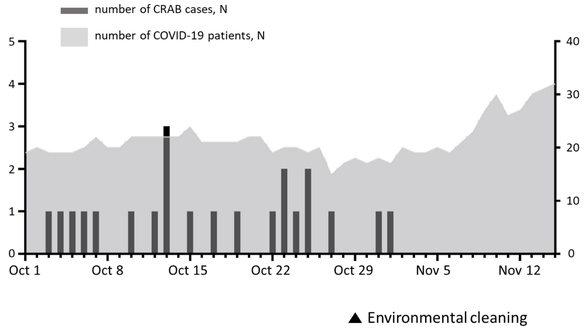
Methods

We analyzed all COVID-19 patients with CRAB in any culture specimen, who admitted to an isolation ward for COVID-19 of a tertiary hospital in South Korea from October to November 2021.

Results

During the outbreak period, a total of 23 patients with COVID-19 and CRAB were identified (Figure 1). Index case was 85-year old female patient who was referred from a long-term care facility.

Figure 1. Daily number of cases with carbapenem-resistant *Acinetobacter baumannii* during outbreak period



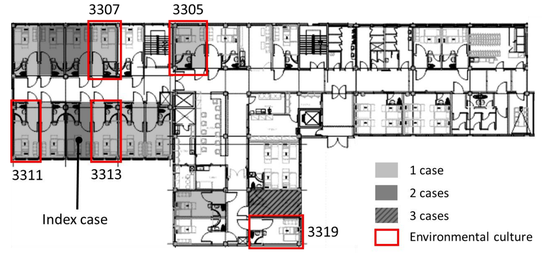
The mean age of cases was 72.9 and 14 (60.9%) patients were male. In most patients (91.3%), CRAB were identified in sputum culture, two were identified in blood culture at initial, and four patients were identified in sputum and blood culture at the same time. Most of the patients were applying high flow nasal cannula (26.1%) or mechanical ventilation (60.9%)(Table1). As shown in figure 2, CRAB outbreak occurred mainly in the wards around the index case, and in particular, environmental culture was carried out in the area marked with a rectangle.

Table 1. Baseline characteristics of patients with multidrug resistance *Acinetobacter Baumannii* acquisition

Gender, male	14 (60.9)
Age, years	72.9 (±13.8)
Initial specimen	
Sputum	21 (91.3)
Blood	6 (26.1)
Urine	1 (4.3)
Skin swab	1 (4.3)
Severity	
Mild (room air or nasal cannula)	3 (13.0)
Moderate (HFNC or ventilator)	18 (78.3)
Severe (CRRT or ECMO)	2 (8.7)
Duration from admission to CRAB isolation, days	13.3 (±11.0)
Vaccination	8 (34.8)
Underlying disease	
Hypertension	16 (69.6)
Diabetes mellitus	10 (43.5)
Cardiovascular disease	8 (34.8)
Chronic lung disease	4 (17.4)
Solid cancer	6 (26.1)
Hematologic malignancy	2 (8.7)

CRAB was cultured on the floor, air inlet, air outlet, and window frame of the ward except for wards 3305 and 3319. Phenotypic antimicrobial resistance patterns of CRAB isolates from patients and environment were identical. Whole genome sequencing showed the high genetic correlation that all of them can be regarded as the same clonality of isolates regardless of the patient's room or incubation date. We applied the environmental cleaning using sodium hypochlorite(NaClO) 1000ppm and phenolic compounds more than twice a day, enhanced hand hygiene, and additional gowning and gloving over personal protective equipment (PPE) mandatory for COVID-19 on 29th October. No additional CRAB cases occurred since 2nd November 2021 for two weeks.

Figure 2. Floor plan of isolation ward with *Acinetobacter baumannii* outbreak



Conclusion

Even when PPEs and precautions for COVID-19 are applied to isolation wards for COVID-19, it is helpful for preventing transmission of multidrug-resistant bacteria to apply additional contact precautions and environmental cleaning

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