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Clinical characteristics and distribution of capsular types of community-acquired, healthcare-associated and nosocomial Klebsiella pneumoniae bacteraemia in Taiwan

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Background: *Klebsiella pneumoniae* bacteraemia is a major cause of morbidity and mortality worldwide. Capsular polysaccharide is an important virulent factor of *K. pneumoniae* infections, and strains with capsular type K1, K2, K5, K20, K54, and K57 are virulent and prevalent in community-onset pyogenic infections in Asian countries. Healthcare-associated (HCA) bacteraemia was proposed as a new epidemiological category in community-onset infections that was similar to nosocomial infections in terms of clinical features and antimicrobial resistance. Studies regarding the different clinical characteristics and distribution of capsular types among community-acquired (CA), HCA, and nosocomial *K. pneumoniae* bacteraemia were limited. We conducted this study to compare clinical characteristics, antimicrobial resistance, and capsular types of *K. pneumoniae* bacteraemia among community-acquired (CA), HCA, and nosocomial infections.

Material/methods: A retrospective study of patients with *K. pneumoniae* bacteraemia was conducted in a medical centre in Taiwan from August to December, 2015. Community-onset bacteraemia included CA and HCA infections. HCA *K. pneumoniae* bacteraemia was defined as bacteraemia occurred within 48 hours of admission meeting the defined criteria of healthcare exposure. The virulent capsular types (K1, K2, K5, K20, K54, and K57) were detected by the polymerase chain reaction. Clinical features, antimicrobial resistance, and distribution of capsular types were compared among CA, HCA, and nosocomial bacteraemia.

Results: A total of 149 patients with *K. pneumoniae* bacteraemia were identified. Twenty-five patients (16.7%) were CA infection, 47 patients (31.5%) were HCA infection, and the remaining 77 patients (51.8%) were nosocomial infection. The 28-day mortality was highest in nosocomial infection (36.4%), followed by HCA infection (23.4%), and nosocomial infection (16.0%). Wild-type antibiotic susceptibility (only resistant to ampicillin) was significantly more common in strains from CA infection than that from nosocomial infection (76.0% versus 45.5%, p = 0.008), and was higher than that from

HCA infection with borderline statistical significance (76.0% versus 55.3%, $p = 0.084$). Multidrug resistance phenotype was more common in strains from nosocomial and HCA infection than that from CA infection (39.0% versus 4.0%, $p = 0.001$; 36.2% versus 4.0%, $p = 0.003$, respectively). Notably, the proportion of the strains with virulent capsular types was similar between CA and HCA infection (48.0% versus 34.0%, $p = 0.247$), and the proportion of them was significantly higher than that in nosocomial infection (48.0% versus 16.9%, $p = 0.002$; 34.0% versus 16.9%, $p = 0.029$, respectively).

Conclusions: Strains from HCA bacteraemia have similar resistance phenotype to that from nosocomial bacteraemia. However, the proportion of strains with virulent capsular types in HCA bacteraemia was more close to that in CA bacteraemia. We suggested that HCA bacteraemia is a distinct category in terms of the microbiological features.