



# Gastrointestinal carriage of *Klebsiella pneumoniae* is a risk factor of subsequent hospital acquired infection

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With great interest we have read the position paper in a recent issue of the *Clinical Infectious Diseases* from Claire L. Gorrie and colleagues defining gastrointestinal (GI) carriage is a major reservoir of *Klebsiella pneumoniae* (*K. pneumoniae*) infection in intensive care patients (1). The results indicated the community-acquired GI carriage of *K. pneumoniae* was 5.9%, which was much lower than that of the hospital-acquired (HA) carriage (19%), at the ICU administration. The clinical significances of the GI *K. pneumoniae* carriage in ICU setting were featured as a powerful association with subsequent *K. pneumoniae* infections, and a direct genomic link between colonizing and infection strains. Apart from 12% infection cases resulting from nosocomial transmission, most of *K. pneumoniae* infections were attributable to patients' own GI strains. Therefore, the authors conclude that the GI of *Klebsiella pneumoniae* is a significant risk factor for HA infection (1).

The study conclusion appears to be in coincidence with the prior researches. Early in the 1970s, a study in the Denver Veterans Administration Hospital found the evidence that 18.5% rectal swab culture positive of colonization at patients' admission to various wards, and a strong association between GI carriage and the following HA infection (45% vs. 11%; OR =4.0; P=0.0009) (2). More recently, Martin and colleagues reported the similar GI colonization rate of 23% and the elevated risk (OR =4.1; P=0.00002) of subsequent infection rate of 5.2% (1.3% in non-colonized) in the year of 2016 (3). The similar results

in the current study of Australia, with the focus on the ICU settings, were more precise and rigorous.

As GI microbiome was proved a source of *K. pneumoniae* (no matter whether or not MDR isolates) infections in ICU, screening and isolation of carriers could help end probable subsequent HA infections. The existing studies of carbapenemase-producing (4) and ESBL (5) *K. pneumoniae* GI carriage screening in the ICU setting also proved helpful for limit and prevent nosocomial current and future infection outbreaks. Besides *K. pneumoniae*, the colonization of other pathogens including carbapenem-resistant *A. baumannii*, methicillin-resistant *S. aureus*, vancomycin-resistant *Enterococcus*, and other ESBL or carbapenemase-producing *Enterobacteriaceae* clinical strains are also major reservoir of HA infections. Therefore, routine screening for nasal or gut carriage of these organisms has been recommended in health-care settings to restrict the nosocomial infection (6,7).

Carbapenem-resistant *K. pneumoniae* (CRKP) has become a major public concern, which was mainly mediated by the production of carbapenemases (8). Based on the CHINET antimicrobial resistance surveillance program reported from 2005 to 2014, the resistance rates of *K. pneumoniae* to imipenem and meropenem increased markedly, from 1.3% to 14.6% and from 0% to 15.2%, respectively (9). Patients suffered from carbapenemase-producing *K. pneumoniae* (CP-Kp) infections (especially for hypervirulent CP-Kp) with high morbidity and mortality (10). Several studies

have demonstrated positive rectal carriage of *K. pneumoniae* was significantly associated with risk of subsequent HA infection (3,11). However, the study of whether carriage of *K. pneumoniae* in patients poses a risk for subsequent infection is rare. The further Multicenter with large sample size prospective study including well-equipped medical centers across the different continents in the world was recommended to get more elaborate results for the risk of infection caused by CP-Kp infections (especially for hypervirulent CP-Kp). Currently, there was a rapid increase of reported cases caused by CRKP in these years worldwide and we consider that there is an optimal window of opportunity to contain this infection before it becomes widespread. To this end, it will be necessary to follow the example of community-acquired methicillin-resistant *Staphylococcus aureus* in Hong Kong (12). We need to strengthen the active surveillance and implement effective preventive and control measures and hence to include CRKP infection as a statutory notifiable infectious disease.

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### Footnote

*Conflicts of Interest:* The authors have no conflict of interest to declare.

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