

**Title:** Multi-clonal spread of *Klebsiella pneumoniae* across hospitals in Khartoum, Sudan

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## **Background:**

The emergence and global expansion of hypervirulent and MDR clones of *Klebsiella pneumoniae* have been increasingly reported in community-acquired and nosocomial infections. The epidemiology of MDR *K. pneumoniae* are still poorly understood in many low- and middle-income countries. The aim of the study was to investigate the epidemiology of MDR *K. pneumoniae* by using Multi Locus Sequence Typing (MLST) of *K. pneumoniae* isolates in Khartoum, Sudan, thereby looking at inter- and intra-hospital spread of clones.

## **Material and Methods:**

A total of 117 *K. pneumoniae* isolates were cultured from clinical samples collected from four different hospitals (Souba, Reibat, Bhari, and Um Durman) in Khartoum, Sudan, from April 2015 to October 2016. Isolates were confirmed using 16S–23S rDNA internal transcribed spacer (ITS) PCR, screened for acquired carbapenemases: KPC, NDM, OXA-48, VIM and GES. MLST was done to identify the sequence types (STs) present and eBURST was used to get the population snapshot.

## **Results:**

Our result show a large clonal diversity of MDR *K. pneumoniae* isolates, with a total of 52 different STs, 15 of which are novel and assigned to ST3460-3474. STs 101, 383, 462 and 649 were present in two or more hospitals in Khartoum, suggesting limited intra-hospital clonal spread. All other STs were unique to individual hospitals, and eBURST analysis revealed a pool of inter-hospital circulating clones. *bla*NDM, VIM, OXA-48 were the most common acquired carbapenemases present in several unrelated clones.

## **Conclusions:**

MDR *Klebsiella pneumoniae* is widespread in different hospitals around Khartoum, Sudan. There is a diverse population of inter-hospital circulating clones with 52 different STs identified in total. 15 novel STs have also been assigned across the 4 hospitals. There is limited intra-hospital spread across the city, as only 4 STs were found in more than one hospital. Resistance to carbapenem was found in 50% of isolates, and mediated by plasmid-acquired NDM, OXA-48 and VIM carbapenemases.

## **Figure1: Population snapshot of isolates using e-BURST**

