4 SURVEILLANCE FOR ANTIMICROBIAL RESISTANCE

a Update on carbapenemase-producing *Enterobacteriaceae*

The Johannesburg Antimicrobial Resistance Laboratory and Culture Collection (AMRL-CC) of the Centre for Opportunistic, Tropical and Hospital Infections (COTHI) at the NICD have been testing referred isolates of suspected carbapenemase-producing Enterobacteriaceae (CPE) for the presence of selected carbapenemase genes. CPE have become a threat to healthcare and patient safety worldwide by compromising empiric antibiotic therapeutic choices and increasing morbidity, hospital costs and the risk of death. CPE surveillance is required to determine the extent of the problem as a first step in order to restrain the emergence and spread of CPE. For September 2015, a total of 62 Enterobacteriaceae isolates were received. Fifty-six carbapenem-resistant isolates were screened, 45 of which were CPE isolates (Table 4 and Table 5). The majority of the isolates were *Klebsiella pneumoniae* (36) followed by *Serratia marcescens* (5).

It is important to note that these figures do not represent the current burden of CPEs in South Africa. Given that CPE infections are currently not reportable or notifiable in South Africa, there is no platform for appropriate surveillance reports and consequently no locally representative data is available. This is of major concern since meaningful data can inform public health policy and highlight priorities for action. Controlling the spread and limiting the impact of CPEs in South Africa will require intensive efforts in both the public and private healthcare sectors going forward. NHLS and private laboratories are encouraged to submit suspected CPE isolates based on antimicrobial susceptibility testing (AST) criteria to AMRL-CC, NICD/NHLS. Please telephone (011) 555 0342/44 or email olgap@nicd.ac.za for queries or further information.

A sub-study investigating molecular epidemiology of CPE isolates from the Eastern Cape

Twenty-five *E. cloacae* isolates from January 2013 to April 2014 from 24 patients at five hospitals in the Eastern Cape were investigated using multilocus sequence typing (MLST), pulsed-field gel electrophoresis (PFGE) and MALDI-TOF mass spectrometry data. Eighteen (72%) isolates harboured either one of the following genes: bla_{IMP}, bla_{VIM} or bla_{OXA-48}. Fifteen isolates were positive for bla_{IMP} which is presently a rare gene amongst South African isolates. Figure 2 shows the geographic and temporal relationship between strains. Of concern is the possibility that these highly resistant organisms may not only be transmitted from patient to patient within hospitals, but may also be transmitted at an institutional level from hospital to hospital. These findings point to the need for strict adherence to infection control, and vigilance when transferring or accepting patients between hospitals.

Source: Centre for Opportunistic, Tropical, and Hospital Infections, NICD-NHLS

Table 4. Enterobacteriaceae by CPE enzyme type, AMRL-CC, COTHI, NICD, 2015

Organism	NDM		OXA-48		VIM	
	Sep-15	Jan-Aug 2015	Sep-15	Jan-Aug 2015	Sep-15	Jan-Aug 2015
Klebsiella pneumoniae	27	172	8	57		26
Enterobacter cloacae	1	11	1	7		4
Serratia marcescens	4	27	1	4		2
Providentia rettgeri	1	17				
E. coli		8	2	24		2
Citrobacter freundii		10				
Other Enterobacteri-aceae		9		2		3
Total	**33**	**255**	**12**	**94**	**0**	**37**

NDM: New Delhi metallo-beta-lactamase; **OXA**: oxacillinase; **VIM**: verona integron-encoded metallo-beta-lactamase

Table 5. Enterobacteriaceae isolates by specimen type and province, AMRL-CC, COTHI, NICD, 2015

Organism	GP	KZN	WC	FS	EC	Unk	Total Sept	Total Jan-
Klebsiella pneumoniae	**4**	**9**	**2**	**8**	**4**	**3**	**36**	**295**
Sterile	4	8	2	6	2	3	25	166
Non-sterile	2			2	2	1	7	50
Unknown		2				2	4	79
Enterobacter cloacae				**3**	**7**		**10**	**55**
Sterile				1	6		7	32
Non-sterile				2	1		3	9
Unknown								14
E. coli	**3**						**3**	**44**
Sterile	1						1	27
Non-sterile	2						2	12
Unknown								5
Serratia marcescens		**5**					**5**	**33**
Sterile		1					1	7
Non-sterile								1
Unknown		4					4	25
Providencia rettgeri	**1**						**1**	**17**
Sterile	1						1	9
Non-sterile								0
Unknown								8
Citrobacter freundii	**1**						**1**	**11**
Sterile	1						1	5
Non-sterile								1
Unknown								5
Other Enterobacteriaceae								**33**
Sterile								17
Non-sterile								7
Unknown								9
Total Jan-Aug 2015	**254**	**91**	**7**	**7**	**58**	**71**	**45**	**488**

Figure 2. Strain relatedness as indicated by MLST, PFGE and MALDI-ToF Mass spectrometry