

## Supplementary webappendix

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Supplement to: Munoz-Price LA, Poirel L, Bonomo RA, et al. Clinical epidemiology of the global expansion of *Klebsiella pneumoniae* carbapenemases. *Lancet Infect Dis* 2013; **12**: 785-796.

1 Table. National epidemiological characteristics of Enterobacteriaceae with KPC carbapenemases

Country	Year of first detection	Main organisms	Predominant MLST	Community vs. hospital	Long term care facility involvement	Infection Control interventions at the National level	Country of origin of KPC isolates	Co-production of KPC with other carbapenemases in the same organism
US	Isolate obtained in 1996. Reported in 2001 <sup>1</sup>	<i>K pneumoniae</i>	ST258	Hospital	Yes	Yes, toolkit for hospital and regional surveillances was updated in 2012 <sup>2</sup> : -Hand hygiene -Contact precautions -Staff education -Minimizing and optimizing the use of devices -Patient and staff cohorting -Screening cultures in a selected population at high risk -Antimicrobial stewardship -Laboratory notification of positive cases	Originated in the US <sup>1</sup>	No
Canada	2008	<i>K pneumoniae</i>	ST-258 ST-512	Hospital	None reported	At the provincial level, including: -Rectal surveillance cultures for selected patients -Contact precautions -Cohorting patients -Mandatory notification of healthcare authorities	Greece <sup>3</sup> US <sup>4</sup>	No
Colombia	Isolate obtained in 2005. Reported in 2006.	<i>K pneumoniae</i> <i>P aeruginosa</i>	Kp: ST-258/ST-512 Pa: ST-308, ST-235, ST-1006, ST-1060	-Mainly hospital -Sporadic community isolates reported	None reported	Regional interventions through surveillance networks: -Antibiotic stewardship -Molecular characterization and typing of carbapenem-resistant <i>Enterobacteriaceae</i>	KPC-3 from Israel <sup>5</sup>	VIM <sup>6,7</sup>
Argentina	2006	<i>K pneumoniae</i> <i>P aeruginosa</i>	Kp: ST-258 Pa: ST-654	Hospital	None reported	No	Imported cases not described	No
Brazil	2006	<i>K pneumoniae</i> <i>Pseudomonas</i> spp.	ST-437	Hospital (also in the hospital's wastewater)	None reported	No	Imported cases not described	No

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UK	2003	<i>K pneumoniae</i> (mostly; first isolate in 2007) <i>E. coli</i> (first isolate in 2010), <i>Enterobacter</i> spp. (first isolate in 2003)	Plasmid rather than clonal expansion in north-west England. Scattered ST258 and ST512 elsewhere	Hospital	None reported	Yes, <sup>8</sup> including: -Cohorting patients -Single rooms for carriers -Equipment disinfection -Hand hygiene -Active screening of contacts -Terminal cleaning -Cohorting staff -Enhance communication between healthcare providers -Track readmission of carriers	Greece, Cyprus, Israel, Curaçao <sup>9-11</sup> ; but most cases now reflect domestic spread	Single <i>K. pneumoniae</i> with KPC and VIM enzymes.
Ireland	2009	<i>K pneumoniae</i>	ST-258	Hospital	None reported	Yes, <sup>12</sup> including: -Surveillance cultures to occur in high risk patients - KPCs are reportable -Single room and contact precautions -Consider cohorting staff	Imported cases not described	No
Spain	2009	<i>K pneumoniae</i> (KPC-3) <sup>13</sup> <i>Citrobacter freundii</i> (KPC-2) <sup>14</sup>	Kp:ST-384, ST388	Hospital	None reported	No	Imported cases not described	No
France	2005	<i>K pneumoniae</i>	ST258	Hospital	None	Yes, <sup>15,15</sup> including: -Active surveillance cultures -Contact precautions -Environmental cleaning Antibiotic stewardship	NYC, US 2005 <sup>16</sup> NYC, US, 2005 <sup>17</sup> Greece, 2008 <sup>18</sup> India, 2011 <sup>19</sup> Italy, 2010 <sup>20</sup>	No
Italy	2008	<i>K pneumoniae</i>	ST258 ST512	Hospital	Neuro-rehabilitation unit <sup>21</sup>	No	Unclear if came from a colonized Israeli physician <sup>22</sup>	VIM <sup>23</sup>

Poland	2008	<i>K pneumoniae</i>	ST258	Hospital Sporadic community isolates reported	Yes	Yes <sup>24</sup> , including: - At the hospital level: contact precautions, hand hygiene, microbiological surveillance, - requirement to notify and send suspected isolates to the local Sanitary- Epidemiological Inspectorate which then notifies the Chief Sanitary Inspector	Index case not known, then mostly in-country transmissions. Sporadic imports from US, NYC <sup>25</sup> and Italy (not published yet)	No
Hungary	2008	<i>K pneumoniae</i>	ST258 ST11	Hospital	No	No	Index case came from Greece <sup>26</sup>	No
Greece	2007 (identified from Greek patients in France and Sweden)	<i>K pneumoniae</i>	ST258	Hospital	Yes	Yes, including: -Hand hygiene promotion -Active surveillance cultures among high risk patients -Contact precautions -Isolation or cohorting positive patients -Communication between hospitals and health authorities	Not documented	VIM-1, VIM-4
Israel	2005	<i>K pneumoniae</i>	ST-258	Hospital	Yes	Yes, <sup>27</sup> including: -Mandatory reporting of CRE positive patients (daily census) -Task force in charge of intervening in hospital outbreaks -Contact isolation in single rooms -Cohorting of positive patients and staff -Readmissions were placed again in isolation -Rectal surveillance cultures -Infection control intervention in LTCFs <sup>110</sup> .	Index case presumably came from US	No
Scandinavia	Finland 2009 Sweden 2009	<i>K pneumoniae</i>	ST-258	Hospital	No	No	Finland: Greece, Italy and USA <sup>28</sup> Sweden: Greece <sup>29</sup>	No
India	2002 (exact year is unclear)	<i>K pneumoniae</i>	NA	Hospital	Yes	No	Imported cases not described	NDM-1

China	2004	<i>K pneumoniae</i> <i>P aeruginosa</i>	Kp: ST-11, ST258(Hong Kong)  Pa:ST463	Hospital and Hospital sewage <sup>30</sup>	None	Yes, including: -Infection Control guidelines -Antibiotic stewardship program (underway) -Enhancing the national antimicrobial resistance monitoring system surveillance -Promoting appropriate antibiotic use in veterinary medicine	Imported cases not described	IMP-4, IMP-8
Australia/New Zealand	2010 (reported 2012)	<i>K pneumoniae</i>	ST258	Hospital	No	Yes, including: -Standard infection control precautions - Antimicrobial stewardship -Community based antimicrobial prescribing - Education of stakeholders -Surveillance cultures patients directly transferred from an overseas hospital or exposed to overseas hospital in the last 12 months -Notify facility infection control staff of suspected/proven KPC production.	Greece, Israel	None

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3 MLST: multilocus sequence typing; Kp: *Klebsiella pneumoniae*; Pa: *Pseudomonas aeruginosa*

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