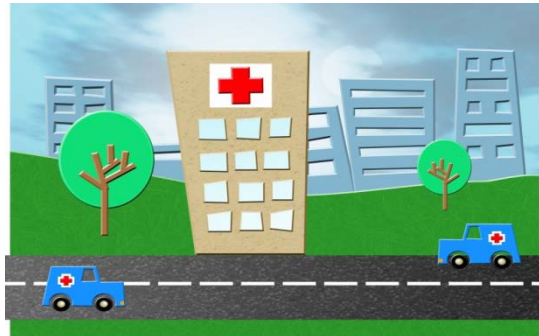


Detection of carbapenemase-producing bacteria in Denmark



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Monitoring in Denmark

- There is **no systematically screening and monitoring of Carbapenemase producing bacteria** in Denmark
- On **voluntary basis**, the Danish departments of clinical microbiology submit **Carbapenem-resistant isolates** for verification and gene typing at Statens Serum Institut, which has facilities for the detection of the most common genes

Carbapenemases:

➤ Serine carbapenemases :

✓ **KPC**, GES-2, -4, -5, -6, -8,
NMC, SME, IMI-1, -2

➤ Metallo-beta-lactamases:

✓ **IMP**, **VIM**, SPM-1, GIM-1,
SIM-1, AIM-1, KHM-1, **NDM-1**,
DIM-1, TMB-1

➤ Oxacillinases:

✓ **OXA-23-gr**, **OXA-24-gr**,
OXA-58-gr, **OXA-143**, **OXA-48**

- *K. pneumoniae*
- *E. coli*
- Other
Enterobacteriaceae
- *P. aeruginosa*
- *A. baumannii*

- *A. baumannii*
- *K. pneumoniae*

One case of VIM-1 *K. pneumoniae* in Denmark

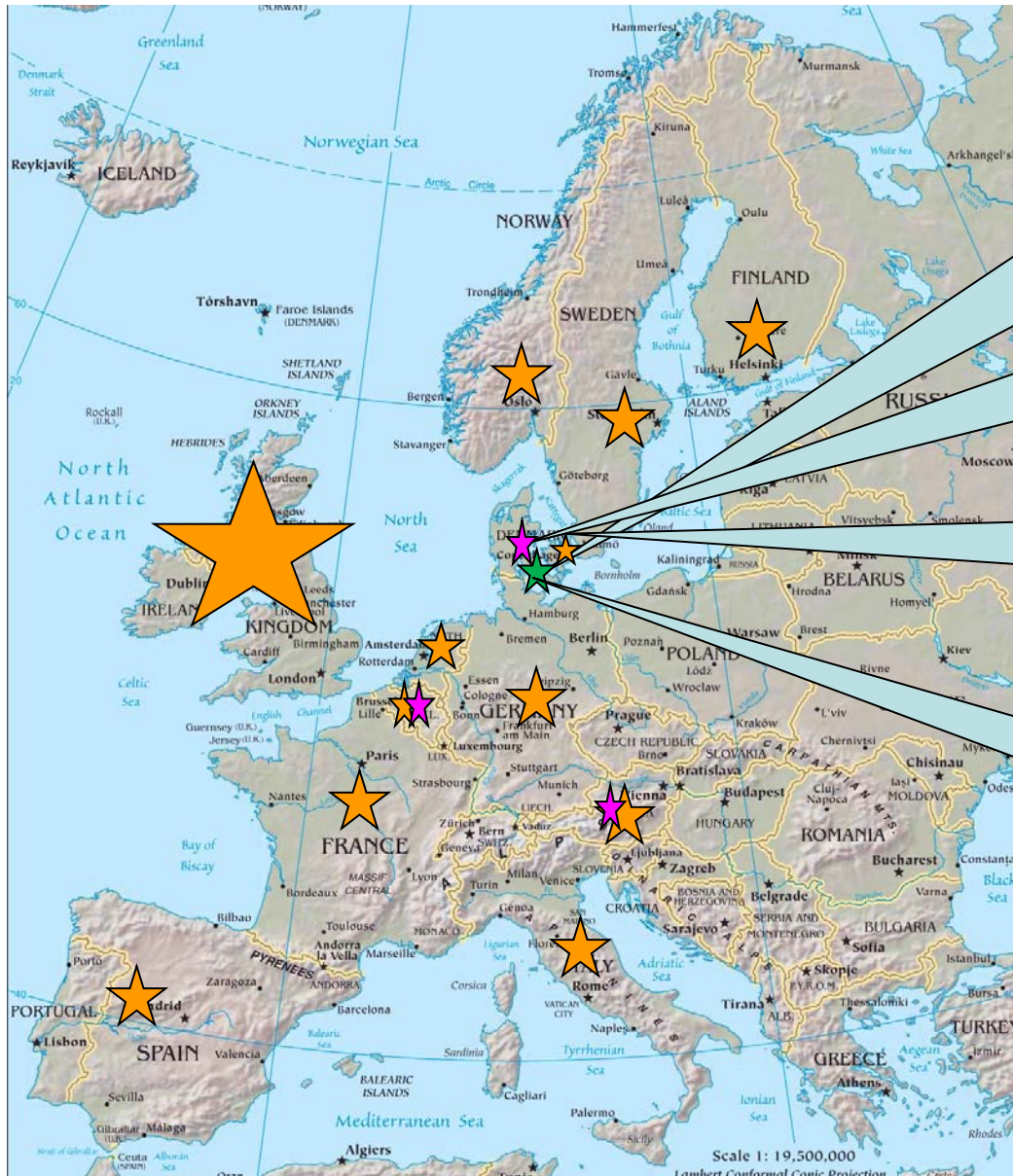
- Patient had been in Greece
- Multi-resistant except colistin and neomycin
- Geno-type $bla_{\text{VIM-1}}$ and $bla_{\text{SHV-5}}$

Two cases of KPC-2 *Klebsiella pneumoniae*

- Both patients had been to Greece
- Multi-resistant, except for gentamicin and polymyxin
- Genetisk profile: bla_{KPC-2} , bla_{TEM-1} , $bla_{SHV-1}1$ og bla_{SHV-12}
- ST258 (MLST)
- 3. case in 2011 with non-travel link



NDM-1 in Denmark



- *Acinetrobacter baumannii*
- Libya
- NDM-1
- Multi-resistant

- *Klebsiella pneumoniae*
- Bosnien-Herzegovina
- Multi-resistant

- *E. coli*
- Pakistan
- Multi-resistant

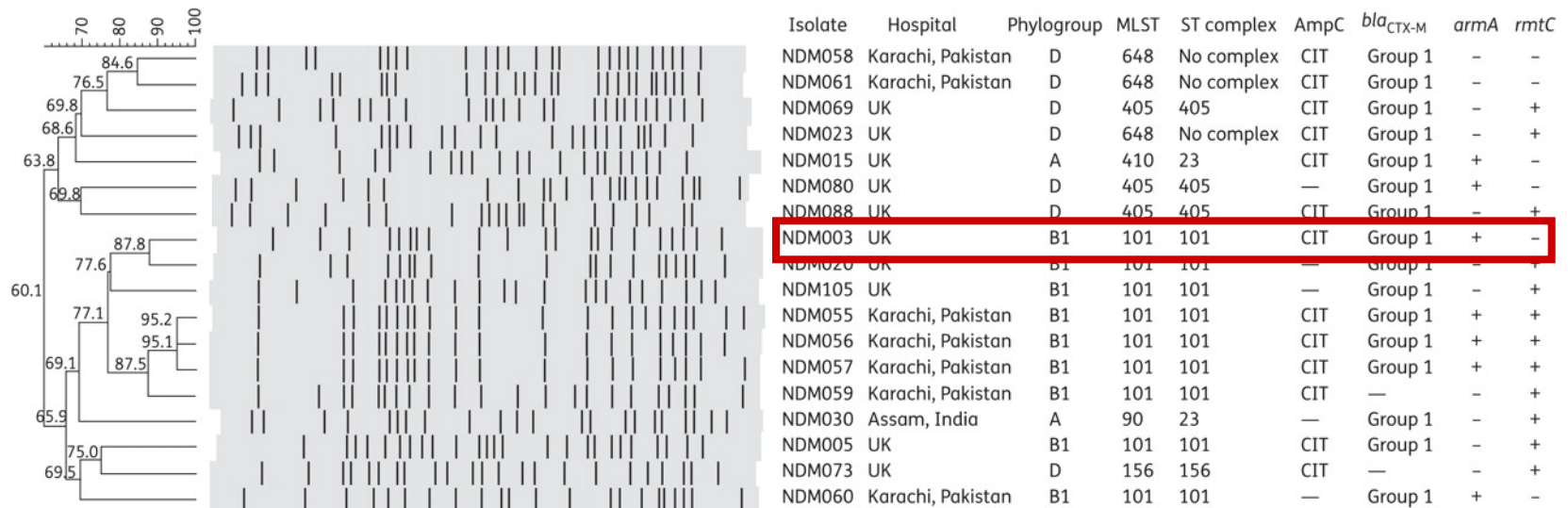
- *E. coli*
- Egypt
- Multi-resistant

★: "Asia link"

★: "Balkan link"

★: "North African link"

Genetic relatedness of NDM-1-producing *E. coli* (Danish isolate had the same profile as the one in the red box)



Mushtaq S et al. *J. Antimicrob. Chemother.* 2011;66:2002-2005 and Nielsen et al. submitted for JAC

15 cases of Carbapenemase-producing Enterobacteriaceae

Enzyme-type	Species	Antal cases	Oprindelsesland	
VIM	<i>Klebsiella pneumoniae</i>	1	Greece	2008
VIM	<i>Klebsiella pneumoniae</i>	1	Greece	2010
KPC-2	<i>Klebsiella pneumoniae</i>	2	Greece	2009
KPC-2	<i>Klebsiella pneumoniae</i>	1	?	2011
NDM-1	<i>Klebsiella pneumoniae</i>	1	Bosnien-Hercegovina	2010
NDM-1	<i>Klebsiella pneumoniae</i>	1	Egypt	2011
NDM-1	<i>Escherichia coli</i>	1	Pakistan	2011
OXA-48	<i>Klebsiella pneumoniae</i>	7	Libya*	2011

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*One patient had an *A.baumannii* producing NDM-1

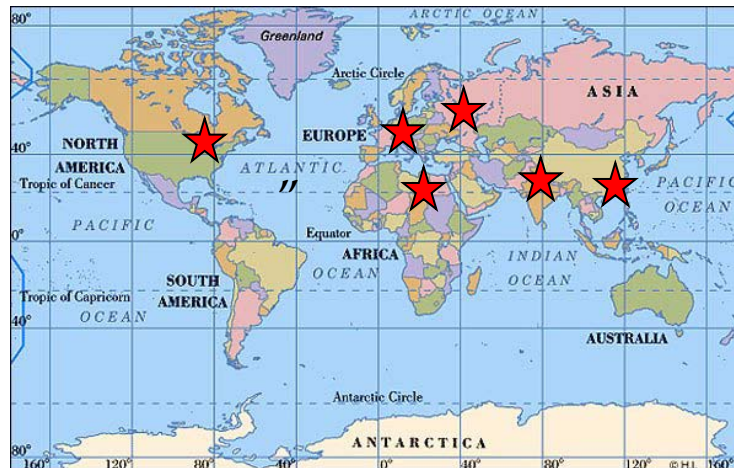
Carbapenemase-producing bacteria (II)

- 1 **NDM-1** cases *Acinetrobacter baumannii*
 - Libya
- 16 **VIM-2** *Pseudomonas auroginosa*
 - Many non-travel and a few travel
- 6 **OXA-23** *A. baumannii* cases
 - ?
- 1 **OXA-24** *A. baumannii* cases
 - *Balkan*

Carbepenemase Hot spots

KPC:

North-America
Israel
Greece
China



VIM/IMP:

Greece
Russia
South-East Asia

NDM:

India
Pakistan
Bangladesh
Balkan

OXA-48:

Turkey
North-Africa

OXA-23/-24/-58:

South-East Asia
Greece

From ECDC report:

”One of the major barriers to our understanding of the **magnitude of risk** that these highly antibiotic-resistant bacteria represent for Europe is that EU Member States **lack systematic surveillance systems** and **policies to detect carriage or infection** with **NDM-producing Enterobacteriaceae** and **Carbapenemase-producing Enterobacteriaceae** generally”