Conclusion: Our data demonstrate that NDM-producing Enterobacteriaceae are spreading within Abu Dhabi Emirate. This supports previous suggestions that these bacteria have already disseminated in the Middle East and threaten successful antibiotic treatment in this region as well.

**P1709** OXA-48, OXA-23 and NDM-1 carbapenemases in gram-negative bacteria from patients from Libya

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Objectives: Multidrug-resistant gram-negative bacteria pose an important challenge for treatment and infection control. Resistance to carbapenems is of special clinical importance and therefore it is necessary to monitor respective resistance mechanisms like carbapenemase production. No data regarding the presence of carbapenemases, extended-spectrum beta-lactamases or acquired AmpC-beta-lactamases have been published for Libya so far.

Methods: Health-care authorities in Germany strongly recommended to screen patients from Libya for multidrug-resistant gramnegative pathogens and to refer those strains to the German reference laboratory for multidrug-resistant gramnegative bacteria. Isolates were tested for the presence of carbapenemases by combined disk-tests with boronic acid or EDTA, modified Hodge-Test, a microbiological bioassay based on cell-free extracts and PCR and subsequent sequencing for KPC, VIM, IMP, NDM, OXA-48, OXA-23, OXA-40 and OXA-58.

Results: Several young patients injured during the recent conflict in Libya were transferred to hospitals in Germany for treatment. From 21 October till 7 November, 2011 isolates of 17 male patients with an age between 14 and 41 years were referred. Klebsiella pneumoniae harbouring OXA-48 as well as CTX-M-15 was found in 13 patients. Acinetobacter baumannii with OXA-23 was found in four patients, two of which also carried a OXA-48 producing K. pneumoniae. Two patients were colonized with a NDM-1 producing A. baumannii. In one of those patients also a K. pneumoniae with OXA-48 was found. One patient was colonized with a K. pneumoniae strain harbouring both a CTX-M-15 ESBL and a DHA-1 AmpC-beta-lactamase.

Conclusion: A considerable number of patients previously hospitalized in Libya carry multidrug-resistant K. pneumoniae strains with OXA-48 as well as A. baumannii strains with OXA-23 or NDM-1. Sometimes co-colonization with both species occurs. Because those patients were screened for multidrug-resistant bacteria immediately after transfer to German hospitals and cared for in single rooms it is highly likely that they acquired those multidrug-resistant strains while hospitalized in Libya. OXA-48, OXA-23 and NDM-1 carbapenemases likely show a high prevalence in Libyan hospitals.

**P1710** First detection of New Delhi metallo-beta-lactamase in a multiple resistant strain of Klebsiella pneumoniae in Iran

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Objectives: New Delhi Metallo-beta-lactamase (NDM-1) is a novel metallo-beta-lactamase. Sporadic cases of NDM-1 positive strains have been reported from different countries suggesting a widespread dissemination. The aim of this study was to detection of Metallo-beta-lactamases in gram-negative bacilli isolated from patients in Tehran hospitals.

Methods: After specific identification tests, the susceptibility to the antibiotics was done by Kirby Bauer method and broth microdilution. Carbapenem resistant isolates were tested for carbapenemase production using modified Hodge test. Carbapenem resistant strains screened for blaKPC gene and genes encoding Metallo-beta-lactamases by using specific primers targeting blaNDM-1, blaVIM-1, blaVIM-2, blaIMP-1, blaIMP-2, and blaSPM. PCR products were sequenced in both directions.

Results: Among 360 collected gram-negative isolates, 23 isolates (6.3%) were resistant to meropenem, 11 isolates (3%) were resistant to ertapenem, and four isolates (1.1%) were resistant to imipenem. Majority of carbapenem resistant isolate were Klebsiella spp. (52.1%) and Escherichia coli (39.1%). Modified Hodge test was positive in 11 (47.8%) of carbapenem resistant isolates showing carbapenemase production. Resistance to third-generation cephalosporins in this study was 65.7% averagely. Of the cephalosporins, cefepime showed the highest activity against all species. In March 2011, we detected a multiple drug resistant Klebsiella pneumoniae isolate that it was resistant to all tested antibiotics except colistin. PCR confirmed that this isolate contained blaNDM-1, blaTEM, blaSHV, and blaCTX-M. Modified Hodge test showed weakly positive result. MBL screening by E-test strips was positive. Class 1 Integron detected in this isolate after PCR using by specific primers. The nucleotide sequence of NDM-1 gene was submitted to the GenBank databases under accession number JN664262.

Conclusion: In this study, detection of blaTEM, blaSHV, blaNDM-1, and blaCTX-M combined with the mobility of class 1 integron in K. pneumoniae suggests that resistance to cephalosporins and carbapenems will continue and these resistances can easily transfer to many different gram negative bacteria. This is the first report of detection of metallo-beta-lactamase NDM-1 in Iran. The rapid spread of NDM-1 positive bacteria showed a major challenge for treatment and control of infectious diseases and all clinicians should be aware the NDM-1 as a potential health threat.

**P1711** New Delhi metallo-beta-lactamase-1 in Acinetobacter baumannii: a report from a tertiary care centre in South India

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Objectives: New Delhi Metallo beta lactamase-1 (NDM-1) is a growing threat worldwide. Though it has been increasingly associated with Enterobacteriaceae, reports of its occurrence in Acinetobacter baumannii has been sporadic. This study was done to detect the presence of NDM-1 in clinical isolates of carbapenem resistant A. baumannii.

Methods: The study was conducted in a 1600 bedded university teaching hospital between April and October 2010. One hundred and sixteen consecutive, clinically significant carbapenem resistant (by disc diffusion test as CLSI guidelines) A. baumannii obtained from respiratory secretions (62), blood (25), exudative specimens (18), body fluids (7) and urine (4) were included in the study. Minimum Inhibitory concentrations (MIC) to imipenem and meropenem were determined by broth microdilution method with suitable controls. Screening for production of carbapenemases and metallobetalactamases (MBL) was done by the Modified Hodge test (MHT) and inhibitor potentiation disk diffusion test using ethylene diamine tetraacetic acid (EDTA) respectively. Presence of blaNDM-1 was detected by Polymerase chain reaction (PCR). Coexistence of other carbapenemases like blaOXA, blaIMP and blaVIM were looked for in NDM-1 producers. Gene sequencing was performed for representative isolates.

Results: Thirteen of 116 carbapenem resistant A. baumannii harboured the blaNDM-1 gene. Amongst them, six also had the blaVIM, blaOXA-23 like and blaOXA -51 like genes, while six others had blaOXA23 and blaOXA51 without blaVIM along with the blaNDM-1. One isolate harboured blaNDM-1 alone. All the 13 isolates exhibited a positive result with MHT and inhibitor based disc test for the presence of carbapenemases and MBL. Their MIC90 to imipenem and meropenem were 32 and 64 mg/L respectively. These NDM-1 producers were obtained from respiratory secretions (9), blood (3) and cerebrospinal fluid (1). The majority of the isolates were from one multidisciplinary intensive care unit (ICU) of the hospital.

Conclusion: With limited therapeutic options, NDM-1 in A. baumannii is a cause for concern in critically ill patients with life threatening infections. They are most often present along with other carbapenemases like blaOXA and blaVIM. Since A. baumannii has the
potential to disseminate in the environment, molecular surveillance is required to detect their presence and distribution. This will help in source control and early intervention to prevent outbreaks in ICU.

**P1712 Increasing prevalence of New Delhi metallo-
beta-lactamase -1 in Entero bacteriaceae: the challenge**

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**Objectives:** Acquired carbapenemases confer extensive antibiotic resistance in Enterobacteriaceae. The emergence and spread of New Delhi metallobeta-lactamases-1 (NDM-1) is a cause for concern. This study was undertaken to detect the production of NDM-1 metallobeta-lactamase (MBL) in Enterobacteriaceae at a tertiary care centre in India.

**Methods:** One hundred and eleven clinically significant Enterobacteriaceae resistant to one of the cephalosporins subclass III were collected during the period April–October 2010. They included Klebsiella pneumoniae -52, Escherichia coli -25, Citrobacter freundii-16, Enterobacter cloacae -16 and Providencia rettgeri -2, isolated from blood (23), respiratory secretions (24), exudative specimens (19) and urine (45) of patients in Intensive care units (ICU) and non-ICU settings. Susceptibility to imipenem and meropenem was performed by disc diffusion and Minimum inhibitory concentration (MIC) determined by broth microdilution with suitable controls. Results were interpreted according to CLSI January 2011 guidelines. Carbapenemase production was screened by Modified Hodge test (MHT) and MBL production by inhibitor potentiated disk diffusion tests with ethylene diamine tetracetic acid (EDTA). The isolates were subjected to Polymerase chain reaction (PCR) for detection of blaNDM-1. Gene sequencing was performed.

**Results:** BlaNDM-1 was detected in 64 isolates. While the MHT was positive in 57 of them, the MBL screening test was positive in 43. The sensitivity of these tests were 89.1% and 79.6%. MIC90 values for imipenem and meropenem were 4 and 2 mg/L respectively. BlaNDM-1 positive isolates were from blood (17), exudative specimens (13), respiratory secretions (9) and urine (25). The majority of these isolates were K. pneumoniae (31), followed by E. coli (13), E. cloacae (10), C. freundii (9) and P. rettgeri (1). The NDM-1 producers were distributed equally between ICU and non- ICU patients. Twenty-seven isolates were susceptible to carbapenems as per CLSI 2011 interpretation.

**Conclusion:** NDM-1 producing Enterobacteriaceae cause a multitude of infections both in ICU and non- ICU settings. Screening tests have poor sensitivity for NDM-1 producers. Interpretation based on CLSI 2011 guidelines can lead to erroneous susceptibility report. Since the significance of presence of NDM-1 in isolates susceptible to carbapenem is unclear, the need for screening all Enterobacteriaceae with resistance to cephalosporins subclass III is to be considered.

**Commercially available systems for detection of ESBLs including KPC and AMPC**

**P1714 Carbapenemase identification by matrix assisted laser desorption/ionisation time-of-flight mass spectrometry**

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**Objectives:** Resistance of Gram-negative rods to carbapenems has been an increasing problem all over the world. This resistance is caused by an alteration in the outer membrane of the cell wall, by an overexpression of the efflux pumps or by carbapenemase production. Carbapenemases can be detected by methods based on the ability of some compounds to inhibit these enzymes, molecular genetic techniques and by direct visualization of carbapenem hydrolysis. We describe here the use of MALDI-TOF mass spectrometry to detect a carbapenem antibiotic and its degradation by carbapenemases. We describe MALDI-TOF MS assay for carbapenemase detection was validated on 145 strains, including 41 carbapenemase-producing strains, is higher than 97%, with a specificity of a similar value. The strains used for the study included different KPC enzymes (KPC-2 and KPC-3), VIM, IMP and NDM-1 metallo-beta-lactamases. Positive results were obtained also in NDM-1-producing *Acinetobacter baumannii*. The inhibitors can be optimally removed from the sample using ZipTip Pipette Tips (Millipore). Validation of the inhibitor-based method for identification of carbapenemase type is under the evaluation.

**Conclusion:** MALDI-TOF MS assay for carbapenemase detection was introduced to the routine laboratory praxis in the author’s laboratories. The results are comparable with the reference spectrophotometric