SUMMARY

The present study has provided a framework for the investigation of emerging resistance mechanisms, including phenotypic methods and MIC testing using **Sensititer.**

Multiple B- lactamases within one organism (e.g., multiple ESBLs, AmpC, ESBL- AmpC combinations or Carbapenemase) can make phenotypic identification of the B-lactamases difficult.

Differentiation of organisms expressing ESBLs from organisms expressing AmpC , combined ESBL and AmpC, or Carbapenemase is necessary in order to address surveillance and epidemiology , as well as hospital infection control issues associated with these resistance mechanisms.

We used the ESBL and AmpC detection set which was able to differentiate these different resistance mechanisms but was unable to differentiate derepressed from plasmidic AmpC , or to define the exact resistant mechanism(s) present when the organism harbours carbapenemase.

Another phenotype is the Imipenem(IMP)-EDTA combined disc test. The inhibition zones of the imipenem and imipenem-EDTA discs were compared after 16 to 18 hours of incubation in air at 35°C. If the increase in inhibition zone with the Imipenem and EDTA disc was ≥ 7 mm than the Imipenem disc alone, it is considered as MBL positive.

The MIC-based testing has revealed useful susceptibility profiles for several antibiotics including 23 antibiotic for testing gram negative

isolates and 19 antibiotic for testing gram positive isolates. The detected unusual susceptibility profiles for several antibiotics, such as imipenem, meropenem , linezolid and vancomycin, warrant further investigation.

Although our small number of nosocomial isolates, The sensititer was able to identify uncommon resistant bacteria such as *Kluyvera cryoenescens, Aeromonas hydrophila subspecies hydrophila and Raoultella terrigena,*providing the fact that it is a valuable tool which helps to track current and emerging antibiotic resistance trends, and to monitor the effectiveness of infection control measures.

CONCLUSIONS

- Antibiotic resistance represents a major problem in Benha University Hospitals.
- The Sensititer instrument is a very valuable tool for identification and susceptibility testing of the isolates.
- D68C AmpC & ESBL Detection Set is an excellent and cheap test to detect different resistant phenotypes.
- IMP-EDTA combined disc test is a very valuable test to detect MBL production.
- *Klebsiellae spp.* and *S.aureus* were more frequent in adult ICU, neonatal ICU and surgery unit.
- *E.coli* and *S.aureus* were more frequent in dialysis unit. *E.coli* and CONs were more frequent in internal medicine unit.
- *Klebsiellae spp.* and CONs were more frequent in blood.
- All MRSA strains were susceptible to vancomycin, quinuprisitin/ dalfopristin, linezolid and daptomycin.
- Three VRCONS were isolated, in which one was *S.epidermidis* & two were *S. Saprophyticus ss saprophyticus.*
- Three VRE strains were isolated, in which two were *Enterococcus Faecium* and one was *Enterococcum fecalis.*
- Gone should be the days when all doctors can prescribe what they like, when they like ,and antibiotic prescribing should only be possible by doctors and other health professionals who have been certified as competent, probably after undergoing educational programmes in the field.

RECOMMENDATIONS

- Large scale studies including a large number of patients are necessary to give more detailed ideas about the patterns of resistance at Benha University Hospitals.
- Empirical antibiotic coverage for gram-negative and positive bacteria should be considered for patients who are immunosuppressed, those in the ICU, those using a catheter, and those with infection at certain anatomical site (particularly the lung, genitourinary tract, or abdomen).
- Patients who present at the hospital with suspected blood stream infection and who have health care associated risk factors should be treated initially with broad-spectrum empirical antibiotics, pending the results of blood cultures.
- Increase awareness of the antibiotic resistance problem**.**
- Improve surveillance of antibiotic resistance**.**
- Improve antibiotic use in people (all antibiotics must be used at proper doses, dosage intervals, and duration to optimize bacterial killing and minimize the selection pressure for resistance)**.**
- Encourage new drug product development**.**
- Infection control measures (such as gowns and gloves) are crucial in treating patients with resistant organisms**.**
- Increase resources to curb antibiotic resistance in the developing world**.**
- Increase funding for surveillance, research and education.