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Infection Control: Clinical epidemiology of nosocomial infections

Incidence of nosocomial bloodstream infection in intensive care units in Cairo and Beni-Suef University Hospitals

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Objectives: Evaluating the rate of nosocomial blood stream infections (BSIs) in both adult and neonatal ICUs, the causative microorganisms, antimicrobial resistance, outcome of infection, risk factors, and most common isolates with molecular detection of the resistance gene.

Methods: 1091 patients (adults & neonates) admitted to the ICUs between March 2012 and February 2013 were monitored daily and those suspected to develop nosocomial BSIs, according to the criteria stated by the CDC, were selected for enrollment. Positive blood culture samples were subjected to colony identification to detect the causative organisms and antibiotic susceptibility testing. Detection of extended spectrum beta – lactamase producers (ESBLs) was conducted among Gram negative isolates by a screening test and confirmed by double-disc synergy test (DDST). Coagulase negative staphylococci (*CoNS)* isolates were tested by PCR for detection of *mecA* gene as they were the most common isolates in all ICUs. Two hundred and fifty intravenous catheters (IVCs) were collected and cultured by the standard quantitative catheter segment method to detect primary BSIs.

Results: Out of the 1091 patients 117 (10.7%) had nosocomial BSIs. The highest percentage was in the NICU (29.9%), followed by the adult ICU of Beni-Suef University Hospital (10.6%) and the lowest rate was recorded in the adult ICU of Cairo University Hospital (5.8%). Out of those positive cases, 46 patients died (39%) (highest mortality with *CoNS* infections). Gram positive organisms were reported in 84 isolates (62.2%); *CoNS* was the most prevalent (37%) followed by *S. aureus* (12.6%). Gram negative bacilli were reported in 46 isolates (34.1%), where *K. pneumoniae* was the most common (12.6%) followed by *Acinetobacter baumannii* (11.1%). *Candida albicans* was reported in only 5 isolates (3.7%). Gram positive isolates were mostly sensitive to vancomycin (95%), while Gram negative isolates were mostly sensitive to levofloxacin (63%). *CoNS,* the most common strain in different ICUs (n = 50), were tested for production of *mecA* gene by antibiotic susceptibility and PCR. PCR results indicated that 66 % (33/50) were *mecA* gene producers while 96% (48/50) were cefoxitin resistant and resistant to other B-lactam antibiotics by susceptibility testing. Regarding the 250 IVCs cultured, 20 (8%) were culture positive and coincided with results of blood cultures. The highest number of isolates was reported from the NICU and *CoNS* was the most common isolate (80%). These cases represent BSI with a primary site at the vascular access catheter insertion point.

Conclusions: BSI with multi-drug resistant pathogens (especially *CoNS*) is difficult to treat and associated with increased mortality. Vancomycin is the most reliable treatment option, however over-use may lead to emergence of resistance.