ANTIMICROBIAL RESISTANCE AMONG BACTEREMIC PEDIATRIC PATIENTS IN EMERGENCY DEPARTMENT

Thesis
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مقاومة مضادات الميكروبات بين الأطفال المرضى ببكتيريا فى الدم فى قسم الطوارئ

رسالة توطئة للحصول على درجة الماجيستير فى طب الاطفال

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Abstract

In pediatric emergency department (PED), bloodstream and lower airway infections are the most common infections. Because of multiple factors, PEDsare known sources of antimicrobial-resistant organisms. Bacterial resistance to antibiotics is growing up day by day in both community and hospital setting, increasing mortality and morbidity. The purpose of the present study was to determine the causative organisms, antimicrobial resistance patterns and outcome of different types of infections in patients admitted in pediatric emergency department of Cairo University Specialized Pediatric Hospital (CUSPH) aiming to be able to design antibiotic policy for pediatric emergency department. Different clinical samples were collected properly from 388 patients suffering from commonest infections in ER unit. Different specimens were cultured and the isolates were identified by the routine biochemical reactions. Antimicrobial susceptibility (AST) of all isolates were determined by the standard *Kirby Bauer* disc diffusion method. It was found that the most common organism isolated from patients with pneumonia was *pseudomonas* (27.7%), while *CONS* was the most prevalent among patients with sepsis (42.9%) and *E.coli* among patients with UTI (7/11) 63.6%.Gram negative organisms isolated from blood showed highest sensitivity to: ciprofloxacin (CIP) 67%, aztreonam (ATM) 53.6% and gentamycin (GN) 41.3%, while Gram positive organisms, showed highest sensitivity to: vancomycin (VA) 100%, teicoplanin (TEC) 86.5% and clindamycin (DA) 42.5%.Gram negative organisms isolated from BAL showed highest sensitivity to: ciprofloxacin (CIP) 43.4%, imipenem (IPM) 42.3% and meropenem (MEM)37% , while Gram positive organisms showed 100% sensitivity to vancomycin (VA), teicoplanin (TEC), clindamycin (DA) and erythromycin (E) and 66% to doxycycline (DO).Gram negative organisms isolated from urine culture samples showed highest sensitivity to: ciprofloxacin (CIP) 83.3%, meropenem(MEM) 44.3% and amikacin (AK) 25%, while Gram positive organisms showed 100% sensitivity to vancomycin(VA), 100% to gentamycin (GN), 0% to doxycycline (DO) .Antibiotic sensitivity pattern in cases of pneumonia showed that the most sensitive antibioticsinclude ciprofloxacin (CIP), imipenem (IPM) and meropenem(MEM), in cases of sepsis include vancomycin (VA), teicoplanin(TEC), and clindamycin (DA) and in cases of UTI include ciprofloxacin (CIP), ceftazidime(CAZ) and amikacin(AK).Antibiotic sensitivity pattern in cases of community acquired infections showed thatthe most sensitive antibiotics in Gram negative organismswere as follows: ciprofloxacin (CIP), imipenem (IPM), meropenem (MEM) and amikacin(AK), while the most sensitive antibiotics in Gram positive organismswerevancomycin (VA), teicoplanin(TEC) and clindamycin (DA).Antibiotic sensitivity pattern in cases of hospital acquired infections showed that the most sensitive antibiotics in Gram negative organismswere as follows: ciprofloxacin (CIP), imipenem (IPM) andmeropenem (MEM), while the most sensitive antibiotics in Gram positive organisms werevancomycin (VA), teicoplanin(TEC) and clindamycin (DA).This antibiotic policy is updated periodically according to microbiology laboratoryreports according to the most prevalent organism and most sensitive antibiotics in each sample.

Key words: Incidence, Antimicrobial resistance, Pediatrics, Infection control, Nosocomial infection.

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List of Abbreviations

ABCs	Active Bacterial Core Surveillance
ACCM	American College of Critical Care Medicine
AHA	American Heart Association
AIDS	Acquired Immunodeficiency Syndrome
AK	Amikacin
AMC	Amoxicillin Clavulanic acid
AMP	Ampicillin
AOM	Acute Otitis Media
ARDS	Acute Respiratory Distress Syndrome
ATM	Aztreonam
BAL	Bronco Alveolar Lavage
BID	Twice Daily
Bla1	β-lactamase Inhibitor
$BlaR_1$	β-lactamase Regulator $_1$
BlaZ	β-lactamase Z
BLR	β-lactamase Resistant
BSBL	Broad Spectrum β-lactamases
BSI	Blood Stream Infections
CA-MRSA	Community Acquired Methicillin-Resistant *Staphylococcus aureus*
CAP	Community Acquired Pneumonia
CAZ	Ceftazidime
CDC	Centers for Diseases Control and Prevention
CEC	Cefaclor
CFP	Cefoperazone
CIP	Ciprofloxacin
CLSI	Clinical and Laboratory Standards Institute
CMBCS	Continuous Monitoring Blood Culture Systems
$cMLS_B$	Constitutive Macrolide-lincosamide-streptogramin B
CMV	Cytomegalovirus.
CNS	Central Nervous System
CONS	Coagulase Negative Staphylococci
CPIS	Clinical Pulmonary Infection Score
CRO	Ceftriaxone
CRP	C-Reactive Protein
CRT	Capillary Refill Time
CSF	Cerebrospinal Fluid
CTX	Cefotaxime
CUSPH	Cairo University Specialized Pediatric Hospital
CXM	Cefuroxime

List of Abbreviations

D & V	Diarrhea and Vomiting
DA	Clindamycin
D-Ala	D-Alanine
DNA	Deoxyribonucleic Acid
DO	Doxycycline
DRSP	Drug Resistant *S pneumoniae*
DVT	Deep-Vein Thrombosis
E	Erythromycin
E.coli	Escherichia Coli
ED	Emergency Department
erm	Erythromycin ribosome methylase
ESBL	Extended -Spectrum β-lactamase
ESR	Erythrocyte Sedimentation Rate
ETT	Endotracheal Tube
FDA	Food and Drugs Administration
FEB	Cefepime
GASpharyngitis	Group A Streptococcal Pharyngitis
GN	Gentamycin
HBV	Hepatitis B Virus
HCP	Health Care Personal
Hib	*Haemophilusinfluenzae* type b
HIV	Human Immunodeficiency Virus
HPS	Health Protection Scotland
ICU	Intensive Care Unit
IDSA	Infectious Diseases Society of America
IHI	Institute for Health Care Improvement
ILs	Interleukins
$IMLS_B$	Inducible Macrolide-lincosamide-streptogramin B
IPM	Imipenem
IV	Intravenous
IVP	Intravenous Pyelography
KPC	KlebsiellapneumoniaeCarbapenemase
LOS	Length of Stay
LPF	Low-Power Field
LPS	Lipopolysaccharide
LRT	Lower Respiratory Tract
MDR	Multidrug Resistance
Mec A	Methicillin A
Mec I	Methicillin Inhibitor
Mec R_1	Methicillin Regulator
MEM	Meropenem
MIC	Minimum Inhibitory Concentration
MLSB	Macrolide-lincosamide-streptogramin B

List of Abbreviations

MMWR	Morbidity and Mortality Weekly Report
MODS	Multiple Organ Dysfunction Syndrome
MOTTS	Mycobacteria Other Than Tuberculosis
MRI	Magnetic Resonance Imaging
MRSA	Methicillin-Resistant *Staphylococcus aureus*
MSSA	Methicillin-Sensitive *Staphylococcus aureus*
NDM_1	New Delhi Metallo-β-lactamase-1
NF	Nuclear Factor
NHS	National Health Service
NICU	Neonatal Intensive Care Units
NIs	Nosocomial Infections
NNIS	National Nosocomial Infections Surveillance
NP	Nasopharynx
OD	Once Daily
OP	Oropharynx
OPA	Ortho-Phthalaldehyde
OSHA	Occupational Safety and Health Administration
OX	Oxacillin
PALS	Pediatric Advanced Life Support
PBP	Penicillin Binding Protein
PCMX	Para Chloro Meta Xylenol
PCR	Polymerase Chain Reaction
PCT	Procalcitonin
PCV7	Pneumococcal Conjugate Vaccine
PED	Pediatric Emergency Department
PEEP	Positive End Expiratory Pressure
PICU	Pediatric Intensive Care Unit
PJP	*Pneumocystis Jirovecii*Pneumonia
PVL1	Panton-Valentine leukocidin
QID	Four Times Daily
RNA	Ribonucleic Acid
RNS	Reactive Nitrogen Species
ROS	Reactive Oxygen Species
RSV	Respiratory Syncytial Virus
SAM	Ampicillin- Sulbactam
SCF	Sulperazon
SIRS	Systemic Inflammatory Response Syndrome
SPSS	Statistical Package for the Social Science
SSSS	Staphylococcal Scalded Skin Syndrome
SXT	Sulfamethoxazole-Trimethoprim
TB	Tuberculosis
TEC	Teicoplanin

TID	Thrice Daily
TSS	Toxic Shock Syndrome
TSST-1	Toxic Shock Syndrome Toxin-I
TZP	Piperacilina+Tazobactam
UNICEF	United Nations Children's Emergency Fund
URT	Upper Respiratory Tract
USA	United States of America
UTI	Urinary Tract Infection
VA	Vancomycin
VAP	Ventilator Associated Pneumonia
VISA	Vancomycin Intermediate *Staphylococcus aureus*
VRE	Vancomycin-Resistant Enterococcus
VRSA	Vancomycin Resistant *Staphylococcus aureus*
VUR	Vesicoureteral Reflux
WBCS	White Blood Cells
WCC	White Cell Count
WHO	World Health Organization

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Introduction & Aim of the work

Review Of Literature

Patients & Methods