93

NATURE-BASED SOLUTION FOR PUBLIC HEALTH PROTECTION: MITIGATING ANTIMICROBIAL RESISTANCE IN HOSPITAL EFFLUENT

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Introduction: Antimicrobial resistance (AMR) is one of the foremost global public health challenges. Hospital effluents release resistant bacteria, resistance genes, and antimicrobial residues into aquatic ecosystems, fostering the spread of AMR. In this context, nature-based solutions (NbS), such as phytoremediation, have emerged as low-cost alternatives for mitigation. This study aimed to evaluate the potential of two aquatic plant species in removing antimicrobials, resistant bacteria, and carbapenemase genes from hospital wastewater.

Methods: Effluent samples were collected from a hospital in Lapa (Paraná) and subjected to three 10-L treatments in triplicate: EFL (effluent without plants), SAL (*Salvinia molesta*), and PTC (*Pontederia crassipes*). After seven days, samples were analyzed for antimicrobial residues (tetracyclines and beta-lactams) using the TwinSensor rapid test. Colony-forming units (CFUs) were quantified, resistant strains identified on ESBL agar, and carbapenemase genes (KPC, IMP, NDM, VIM, OXA-48) detected using Medomics rapid tests.

Results: In the EFL group, antimicrobials were detected (tetracycline 80 μg/L, oxytetracycline 60 μg/L, amoxicillin 2 μg/L, penicillin 3 μg/L), along with KPC, IMP, and NDM genes. Resistant isolates included *Klebsiella pneumoniae*, *Escherichia coli*, *Pseudomonas* spp., and *Proteus* spp. Phytoremediation with *S. molesta* achieved complete removal of antimicrobials and resistance genes, total elimination of *E. coli*, and 99% reduction of other resistant species. *P. crassipes* achieved 100% beta-lactam removal, 56% tetracycline reduction, and partial gene suppression (IMP and NDM). Given that the hospital mainly treats respiratory diseases, these findings reinforce the relevance of NbS in preventing AMR dissemination into aquatic ecosystems and its implications for public health.

Conclusion: Phytoremediation proved to be an effective and innovative NbS for reducing microbial and genetic AMR load in hospital effluent. The results reinforce the contribution of this ecotechnology to the protection of public and environmental health.

Keywords: Phytoremediation, Carbapenemases, One Health, Antimicrobial-Resistant Bacteria.

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94

STEWARDSHIP: IMPLEMENTATION OF AN ELECTRONIC TOOL FOR ANTIMICROBIAL MANAGEMENT IN A PUBLIC REFERENCE HOSPITAL FOR INFECTIOUS DISEASES

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Introduction: Antimicrobial resistance is one of the major threats to global public health, driven by the indiscriminate use of antibiotics and worsened during the COVID-19 pandemic. This scenario compromises therapeutic effectiveness and increases morbidity, mortality, and hospital costs. Antimicrobial Stewardship Programs (ASP) are recommended by national and international health authorities as a key strategy to promote rational antibiotic use.

Objective: To implement an electronic tool for auditing and monitoring the consumption of broad-spectrum antimicrobials, focusing on the use of meropenem, polymyxin B, vancomycin, and teicoplanin, as well as to describe the interventions carried out by the hospital infection control service.

Methods: A retrospective observational study was conducted between July 2024 and January 2025, analyzing 256 prescriptions from hospitalized patients. Data were obtained from the electronic medical record and hospital antimicrobial dispensing reports. The applied metrics were Defined Daily Dose (DDD) and Days of Therapy (DOT). Clinical interventions were classified and their acceptance rate analyzed. Power BI was used to develop interactive dashboards and perform visual data analysis.

Results: Among the prescriptions analyzed, 82.8% were empirical. Clinical interventions were performed in 39.4% of cases, with a 98% acceptance rate. The main actions were therapy discontinuation and culture-guided adjustment. Meropenem was the most frequently used agent. The predominant infection focus was respiratory (52.3%), and most audits were performed in intensive care units (84.8%). Temporal variations in DOT and DDD were expressed in graphical format.

Conclusion: The implementation of the electronic tool enabled qualified monitoring of antimicrobial use and guided timely clinical interventions, strengthening the institutional stewardship program. Prospective auditing demonstrated a positive impact on prescription rationalization, particularly in ICUs, revealing high consumption rates and frequent need for adjustment. The predominance of empirical therapy, combined with a high acceptance of the recommendations, indicates opportunities for continuous improvement and consolidation of safe prescribing practices in the face of growing microbial resistance.

Keywords: Antimicrobial Stewardship, Antimicrobial Management, Business Intelligence, Antimicrobial Resistance, Antibiotics.

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95

SUCCESSFUL MANAGEMENT OF DRUG-INDUCED LIVER INJURY CAUSED BY CEFTAZIDIME-AVIBACTAM AND AZTREONAM IN A PATIENT WITH OTOMASTOIDITIS DUE TO CARBAPENEMASE-PRODUCING *PSEUDOMONAS AERUGINOSA* (IMP)

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Introduction: Drug-induced liver injury (DILI) is a potentially severe and underestimated condition that can occur in patients exposed to multiple broad-spectrum antimicrobial regimens for prolonged periods. DILI poses a diagnostic challenge due to the lack of specific biomarkers and the multiplicity of possible causative agents. Early recognition is essential to prevent severe outcomes.

Case Report: A 61-year-old male with hypertension, poorly controlled diabetes, and a history of left lower-limb amputation for diabetic foot was initially admitted with otitis externa that progressed to otomastoiditis caused by carbapenemase-producing *Pseudomonas aeruginosa* (IMP). After failure of previous antimicrobial regimens (ciprofloxacin, ceftazidime, and cefepime), therapy with ceftazidime-avibactam plus aztreonam was initiated according to microbiological susceptibility. A few days after starting treatment, a marked elevation of hepatic enzymes (transaminases and cholestatic enzymes) was observed, showing a mixed-pattern DILI. The antimicrobials and other potentially hepatotoxic drugs were discontinued. After transient improvement, re-exposure led to a new enzyme peak, confirming positive re-exposure. Subsequent attempts with meropenem and polymyxin B also resulted in transaminase elevation, limiting safe and effective antimicrobial options. With surgical intervention deferred due to structural constraints and progression to skull-base osteomyelitis, treatment decisions were discussed with hepatology and palliative-care teams. Prednisone (1 mg/kg/day) and ursodeoxycholic acid (14 mg/kg/day) were initiated, and ceftazidime-avibactam plus aztreonam were cautiously reintroduced with close laboratory monitoring. The patient tolerated therapy well, completing 12 weeks of treatment with satisfactory clinical response.

Discussion: This case underscores the importance of pharmacovigilance, causality assessment in DILI, and multidisciplinary collaboration among infectious-disease, hepatology, and clinical-pharmacy teams to ensure therapeutic safety in complex infectious scenarios.

Keywords: Drug-Induced Liver Injury, Ceftazidime-Avibactam, Aztreonam, DILI, Multidrug-Resistant *Pseudomonas*.

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96

OUTBREAK OF POLYMYXIN-RESISTANT ACINETOBACTER BAUMANNII CARRYING BLAOXA-23 CARBAPENEMASE IN A HOSPITAL IN RIO DE JANEIRO

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Introduction/Objectives: *Acinetobacter baumannii* is a challenging pathogen and a major epidemiological threat responsible for healthcare-associated infections and increasing multidrug resistance, including to last-resort agents such as polymyxins. This study aimed to characterize carbapenem- and polymyxin-resistant *A. baumannii* clinical isolates from a state hospital in Rio de Janeiro.

Methods: Between September and December 2024, nine *A. baumannii* isolates resistant to carbapenems and polymyxin B were received at LabSUR from ICU patients of a state hospital. Carbapenemase genes were screened by multiplex PCR. Clonal relatedness was assessed by pulsed-field gel electrophoresis (PFGE). A representative isolate of the predominant clone underwent whole-genome sequencing (WGS), analyzed through the CABGen pipeline.

Results: All isolates were positive for blaOXA-23 and blaOXA-51 genes. The nine polymyxin-resistant isolates belonged to the same clonal group, six from tracheal secretions and three from surveillance swabs, originating from seven ICU patients (two patients with duplicate samples). Five patients occupied the same ICU beds at different times; two patients died. The sequenced representative strain