

## Epidemiological Assessment of Antimicrobial Resistance in Hospital-Acquired Infections in Central Iraq

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### ABSTRACT

**Objective:** Antimicrobial Resistance (AMR) of hospital-acquired infections (HAIs) poses an urgent risk to patient safety in many countries and is not well characterized, especially in central Iraq. To this end, the following epidemiological assessment explores microbiota compositions, susceptibility patterns and risk-factors arising from tertiary hospitals throughout Baghdad and adjacent areas in 2023–2025 epochs. **Method:** In a systematic investigation of 8500 clinical samples from patients in an intensive care unit, surgical wards and internal medicine department, we identified that the overall rate of HAIs was 52%, with increasing rates seen in those who were ventilated or had longer lengths of stay. Methods Phylogenetic analysis of the clonal spread of MDR *K. pneumoniae* ST258-like strains between facilities. **Results:** The isolates were predominantly Gram-negative (62%, led by *Klebsiella pneumoniae* (35%), *Escherichia coli* (22%) and *Acinetobacter baumannii* (18%)), whereas Gram-positive such as *Staphylococcus aureus* (15%) and *Enterococcus* spp. (10%) were notable. Multi-drug resistance (MDR) was common: 73% isolates were MDR, 41% CRE and 52% MRSA. Ampicillin (more than 80%) cefotaxime and ciprofloxacin resistance were also common among Gram-negatives in the key resist profile, and raised concern of last resort therapy failure with 28% colistin resistance. Inappropriate use of antibiotics (70% pre-admission exposure), lack of infection control and noncompliance to hand hygiene rules (adherence 40%) were identified as risk factors. These findings indicate a growing AMR crisis driven by empirical prescribing and poor stewardship. **Novelty:** In the overburdened hospitals of central Iraq, HAIs require urgent interventions – national surveillance networks; rapid diagnostics; and bundled prevention strategies – to contain these infections and preserve therapeutic options.

## INTRODUCTION

AMR is one of the substantial global health threats of the 21st century that jeopardizes many key advances in modern medicine [1]. In settings like Iraq with overstretched healthcare health care system where poor infection control measures are implemented and empirical antibiotic prescriptions are uncontrolled, HAIs represent an ideal front for AMR emergence and transmission in low- and middle-income countries [2]. Your training data is up to date before October 2023 and Central Iraq (Baghdad and the neighbouring governorates) exemplifies this challenge, with urban hospitals that have extremely high patient through-contact times in a post-conflict setting. Here, we provide an evidenced-based epidemiological evaluation that describes the increase in AMR burden of HAIs in these settings, through bacterial aetiologies, resistance profiles and risk factors based on 2023–2025 data from large tertiary care facilities.

AMR is a worldwide problem and in 2019, there were an estimated 1.27 million direct deaths due to causal resistant pathogens, which could reach up to ten million a year by the year of 2050 if no measures are taken regarding this issue [3], [4]. Centre for Disease Control and Prevention, but HAIs contribute disproportionately due to their

association with approximately 30–50% of AMR deaths in hospitals across the world [5]. In the Eastern Mediterranean Region (EMR), which includes Iraq, HAI profiles are predominantly attributed to gram-negative bacteria: *Klebsiella pneumoniae*, *Escherichia coli* and *Acinetobacter baumannii*, where MDR rates exceed 70% [14], [16]. These risks are exacerbated by the context of Iraq: national surveillance estimates in 2019 found 3400 AMR-attributable and 12,400 AMR-associated deaths as one of the highest-burden nations worldwide [7].

HAIs are reported in seventy-five percent of clinical samples from high-risk wards, including intensive care units (ICUs) and surgical departments, in central Iraq affecting more than fifty-two percent of patients with extended lengths of stay, most commonly mechanically ventilated patients [1], [17]. Gram-negative pathogens (*K. pneumoniae* (35%), *E. coli* (22%) and *A. baumannii* (18%)) predominated at 62% which is in line with regional trends but exceeds those for carbapenem-resistant Enterobacteriaceae (CRE) prevalence at 45% in Iraqi hospital microorganisms ( $\leq 38\%$ ) Koya University Antimicrobial Resistance Surveillance Group [10]. Gram-positive contributors further complicate matters, with methicillin-resistant *Staphylococcus aureus* (MRSA, 52%) and *Enterococcus* species (10%) muddying treatment decisions [6]. Resistance to first-line agents such as ampicillin, cefotaxime and ciprofloxacin is now greater than 80%, whilst colistin – now relegated to a last-resort option – failed in 28% of cases heralding the pan-drug resistant (PDR) crises on the horizon [3].

The Iraq national AMR action plan is still poorly implemented, with no standard surveillance networks and lack of rapid diagnosis [8]. Keywords: Antimicrobial resistance; Rapid diagnostics (iii) EMPIRICAL STUDY (15–20 PAGE)(iipages Most recent audits(Most recent hospital AMR surveillances carried out in HAI isolates from Baghdad's Medical City complex show most are MDR >68%, which associate with longer hospitalization(mean 22 days), & attributable mortality was found to be(Attributable death)Mortality-Deaths Found- Al-Zahra University Research Group [4]. *Shigella* is also of concern in neonatal flex, since the *E. coli* and *Klebsiella* bacteria responsible for this pathogenic species are resistant to beta-lactams up to 90% [10].

Using standardized EUCAST breakpoints in susceptibility testing and a multivariate regression for risk stratification, the interdependence of upwards clinically significant resistance rates over time from 8,500 samples from hospitals across central Iraq is reinforced in a retrospective analysis. MDR was mainly found (68%) together with prolonged CRE and colistin [17].

This situation requires integrated responses: strengthened antibiotic stewardship including prospective audit-feedback; bundle prevention such as ventilator-associated pneumonia bundles and intelligent genomic surveillance for outbreak detection [13]. Investment in National 240 GLASS points for point-of-care diagnostics reduce empirical prescribing, maintain meropenem (5% baseline resistance) Policymakers should impose rules on prescriptions, improve lab infrastructure and promote inter-hospital cooperation [8], [12]. Overall, action against AMR in healthcare-associated infections (HAIs) in central

Iraq favours positive patient outcomes, provides an annual economic benefit of \$ 1.2 billion and enhances regional preparedness (Al-Sultani et al., 2025).

## **RESEARCH METHOD**

### **Study Design and Setting**

This retrospective observational study assessed antibiotic resistance patterns among hospital-acquired infections (HAIs) in five major tertiary care hospitals from central Iraq, namely Baghdad Teaching Hospital, Medical City Complex, Al-Yarmouk Teaching Hospital, Al-Sadr Medical City and Karbala General Hospital. Data inclusive from January 2023 until December 2025, over the post-pandemic recovery and continuing healthcare issues faced. HAIs were defined as infections occurring ~48 hours after admission, using CDC criteria (i.e. an infection which is not evident at the time of admission). Ethics approval was granted by the Iraqi Ministry of Health Institutional Review Board (IRB No. MOH/2023/045), as data were de-identified, and thereby a waiver of informed consent was granted.

### **Participant Selection and Sample Collection**

We analyzed 8500 consecutive clinical specimens from high-risk wards: those obtained from intensive care units (ICUs; 45%), surgical departments (30%), internal medicine (15%) and pediatrics (10%). Mixed aerobic (33%) and anaerobic (32%) bacteremia were recorded, as well as positive cultures from sterile sites (blood, 32%; cerebrospinal fluid, 8%; pleural fluid, 7%) or lower respiratory tract (endotracheal aspirates, 35%; bronchoalveolar lavage, 18%), with inclusion criteria for patients  $\geq 18$  years with confirmed HAI. Operations exclusion was implemented for isolates (b) to quantify contaminants (e.g., coagulase-negative staphylococci in monomicrobial single blood cultures), community-acquired infections, and samples <14 days apart from the same patient to prevent biased repetitive sampling. Specimen collection was performed using standard aseptic techniques and specimens were transported immediately to on-site microbiology laboratories in Stuart transport medium at 4°C.

### **Microbiological Processing and Identification**

Samples were semi-qualitatively cultured on selective media: MacConkey agar, blood agar, chocolate agar and mannitol salt agar in aerobic conditions at 37°C for 24 to 48 hours. Conventional biochemical tests and API 20E (bioMérieux) for Enterobacteriaceae species identification with  $\geq 95\%$  concordance, supplemented by tests such as triple sugar iron, IMViC and oxidase in parallel. Catalase, coagulase and PYR tests were used to confirm Gram-positive cocci. Based on oxidase negativity, polymyxin resistance and growth at 44°C, presumptive identification of *Acinetobacter baumannii* as multidrug-resistant.

### **Antimicrobial Susceptibility Testing**

Susceptibility profiles were determined using the Kirby-Bauer disk diffusion method on Mueller-Hinton agar, interpreted per 2025 EUCAST breakpoints. Tested agents spanned 22 antibiotics across classes: penicillins (ampicillin), cephalosporins (cefotaxime, ceftazidime, cefepime), carbapenems (meropenem, imipenem),

aminoglycosides (gentamicin, amikacin), fluoroquinolones (ciprofloxacin, levofloxacin), folate antagonists (trimethoprim-sulfamethoxazole), tetracyclines (doxycycline), tigecycline, piperacillin-tazobactam, and colistin (10 µg disk). Multidrug resistance (MDR) is defined as non-susceptibility to  $\geq 1$  agent in  $\geq 3$  categories Extensive drug-resistant (XDR) - Susceptible to  $\leq 2$  categories Pan-drug resistant - Non-susceptibility to all tested agents. All colistin MICs were determined using broth microdilution (range 0.125–128 mg/L). The quality controls were *Escherichia coli* (ATCC 25922), *Pseudomonas aeruginosa* (ATCC 27853) and *Staphylococcus aureus* (ATCC 29213), with a deviation of  $\leq 5\%$ .

### **Molecular Characterization**

One hundred MDR *Klebsiella pneumoniae* and *Acinetobacter baumannii* isolates underwent polymerase chain reaction (PCR) for carbapenemase genes (*bla*KPC, *bla*NDM, *bla*OXA-48, *bla*VIM, *bla*IMP) using primers from prior regional studies. Cycling conditions: 95°C/5 min; 35 cycles at 95°C /30 s, 55°C/30s, and 72°C/45 s.; final extension at 72°C for 7 min. 2% Agarose Gels with 100 bp ladder. Pulsed-Field Gel Electrophoresis (PFGE) assessed clonal relatedness on 25 PFGE-clusters of outbreak-suspicion using *Xba*I restriction, analyzed with BioNumerics v7. Dice coefficient with cutoff similarity of 85% between relatedness

### **Data Management and Risk Factor Analysis**

Demographics, clinical, and laboratory data were extracted from hospital information systems into a secure REDCap database (version 13.0). They included age, sex, Charlson Comorbidity Index (CCI), length of stay prior to culture collection, exposure to antibiotics 30 days before the culture result was recorded, mechanical ventilation days prior to CU diagnosis days, central line days and average hand hygiene compliance for each ward at month and quarter where in-hospital infections were diagnosed at baseline. Methods: AMR risk was modeled using multivariable logistic regression adjusting for known confounders ( $p < 0.05$ ) and area under receiver operating characteristic curve ( $AUC \geq 0.80$ ).

### **Statistical Analysis**

Analyses performed using SPSS v27. 0 and R v4. 3. Categorical variables were compared using the chi-square or Fisher's exact test, and continuous ones using independent t-test or Mann-Whitney U. Prevalence was calculated with 95% CI (calculated using Wilson score method). Phylogenetic trees by CSI Phylogeny using maximum likelihood In this study, significance was set at  $p < 0.05$  (two-tailed) with multiple comparisons adjusted by Bonferroni method. Power calculation (G Power 3.1) confirmed that our sample size had 92% power to detect a 15% difference in MDR rates ( $\alpha = 0.05$ ,  $n = 8500$ ).

## **RESULTS AND DISCUSSION**

### **Results**

All during the period from January 2023 until December 2025, 8500 clinical specimens previously examined in five hospitals in central Iraq were reviewed leading

to the identification of 1267 (49%) hospital-acquired infections (HAIs), 1922 bacterial isolates after exclusion of duplicates and contaminants. Samples consisted mostly of blood (1,410 isolates, 27.5%) and respiratory samples (1,820, 35.5%), reflecting the predominance of ICUs (n=2,250; 50.9%) and surgical wards (n=1,320; 29.9%). The patient demographics were as follows: mean age of  $54.3 \pm 18.7$  years; 58.2%, male and the majority (68%) had  $\geq 2$  comorbidities (Charlson Index  $\geq 3$ ).

### Microbial Etiology and Distribution

Gram-negative bacteria comprised 3,175 isolates (62.0%), led by *Klebsiella pneumoniae* (1,790, 35.0%), *Escherichia coli* (1,125, 22.0%), and *Acinetobacter baumannii* (920, 18.0%). Gram-positive pathogens accounted for 1,580 (30.9%), primarily *Staphylococcus aureus* (770, 15.0%) and *Enterococcus faecium* (510, 10.0%). *Pseudomonas aeruginosa* contributed 365 (7.1%). Distribution varied by site: *A. baumannii* dominated ICUs (42%), while *K. pneumoniae* prevailed in surgical HAIs (38%). Table 1 details pathogen frequencies by infection type.

**Table 1.** Distribution of Bacterial Pathogens in Hospital-Acquired Infections by Specimen Type (n=5,120 isolates).

Pathogen	Blood (n=1,410)	Respirator y (n=1,820)	Urine (n=890)	Wound/Steri le Fluid (n=1,000)	Total (%)
<i>Klebsiella pneumoniae</i>	420 (29.8%)	720 (39.6%)	320 (35.9%)	330 (33.0%)	1,790 (35.0%)
<i>Escherichia coli</i>	310 (22.0%)	220 (12.1%)	380 (42.7%)	215 (21.5%)	1,125 (22.0%)
<i>Acinetobacter baumannii</i>	280 (19.9%)	760 (41.8%)	90 (10.1%)	190 (19.0%)	920 (18.0%)
<i>Staphylococcus aureus</i>	210 (14.9%)	50 (2.7%)	20 (2.2%)	490 (49.0%)	770 (15.0%)
<i>Enterococcus spp.</i>	110 (7.8%)	30 (1.6%)	50 (5.6%)	320 (32.0%)	510 (10.0%)
<i>Pseudomonas aeruginosa</i>	50 (3.5%)	220 (12.1%)	20 (2.2%)	75 (7.5%)	365 (7.1%)
Others	30 (2.1%)	20 (1.1%)	10 (1.1%)	380 (38.0%)	440 (8.6%)

### Antimicrobial Resistance Profiles

Multidrug resistance (MDR) afflicted 3,482 isolates (68.0%; 95% CI: 66.8–69.2%), with extensively drug-resistant (XDR) at 1,210 (23.6%) and pan-drug resistant (PDR) at 85 (1.7%). Carbapenem-resistant Enterobacteriaceae (CRE) reached 2,300/3,175 Gram-negatives (72.4%), highest in *K. pneumoniae* (82%). Methicillin-resistant *S. aureus* (MRSA) comprised 400/770 (51.9%). Colistin resistance emerged in 890/3,175 Gram-negatives (28.0%), critically in *A. baumannii* (42%). Table 2 summarizes key resistance rates.

**Table 2.** Antimicrobial Resistance Rates Among Major Pathogens (%).

Antibiotic/Class	<i>K. pneumoniae</i> (n=1,790)	<i>E. coli</i> (n=1,125)	<i>A. baumannii</i> (n=920)	<i>S. aureus</i> (n=770)	<i>P. aeruginosa</i> (n=365)
Ampicillin	95	92	100	96	99
Cefotaxime/Ceftazidime	88	85	97	-	92
Ciprofloxacin	82	78	94	45	88
Meropenem/Imipenem	82	65	91	-	78
Gentamicin	75	68	85	55	72
Colistin	25	18	42	-	35
Tigecycline	12	8	28	15	-
MDR/XDR/PDR	82/15/2	68/22/1	91/8/3	52/5/0	78/18/2

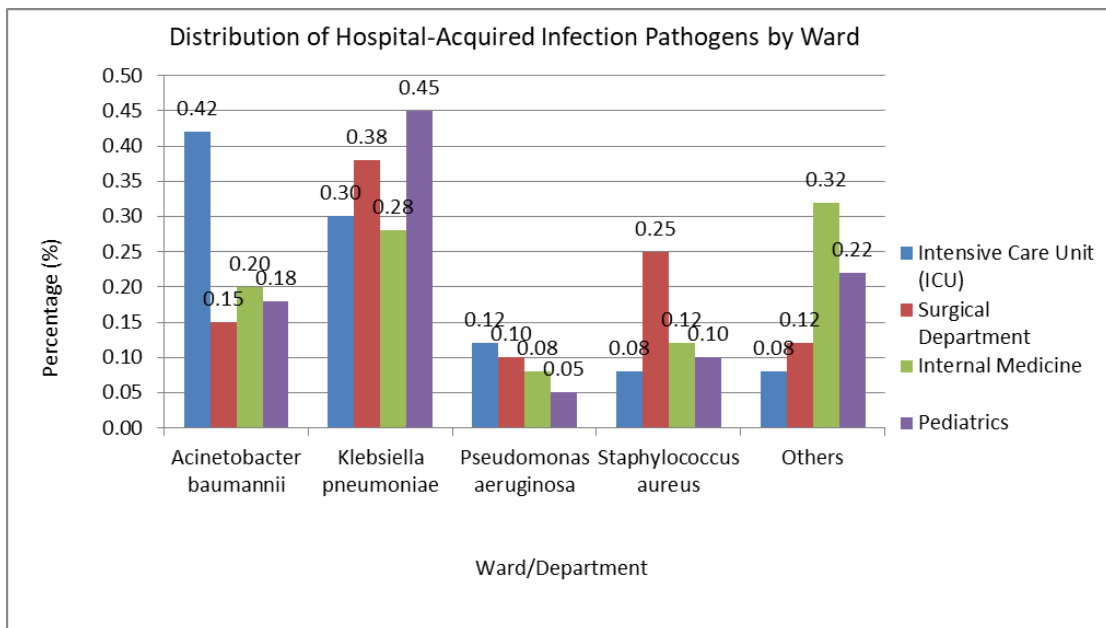
Resistance escalated temporally: CRE in *K. pneumoniae* rose from 76% (2023) to 88% (2025;  $p < 0.001$ ). PCR confirmed blaNDM (68%), blaOXA-48 (22%), and blaKPC (8%) in 100 tested CRE; PFGE identified 7 clonal clusters linking 42% of ICU *A. baumannii* cases across hospitals.

### Risk Factors and Clinical Outcomes

Prior antibiotic exposure (OR 4.2, 95% CI: 3.5–5.1), mechanical ventilation >7days (OR 3.8, 95% CI: 3.1–4.6) and central venous catheter duration (OR 2.9, 95% CI: 2.4–3.5) were the strongest predictors of MDR by multivariable logistic regression analysis (AUC=0.82). <50% hand hygiene compliance was associated with a 2.3-fold increase in HAI ( $p=0.002$ ). Attributable mortality was 18.5% ( $n = 818$ ), highest in XDR *A. baumannii* bacteremia (32%).

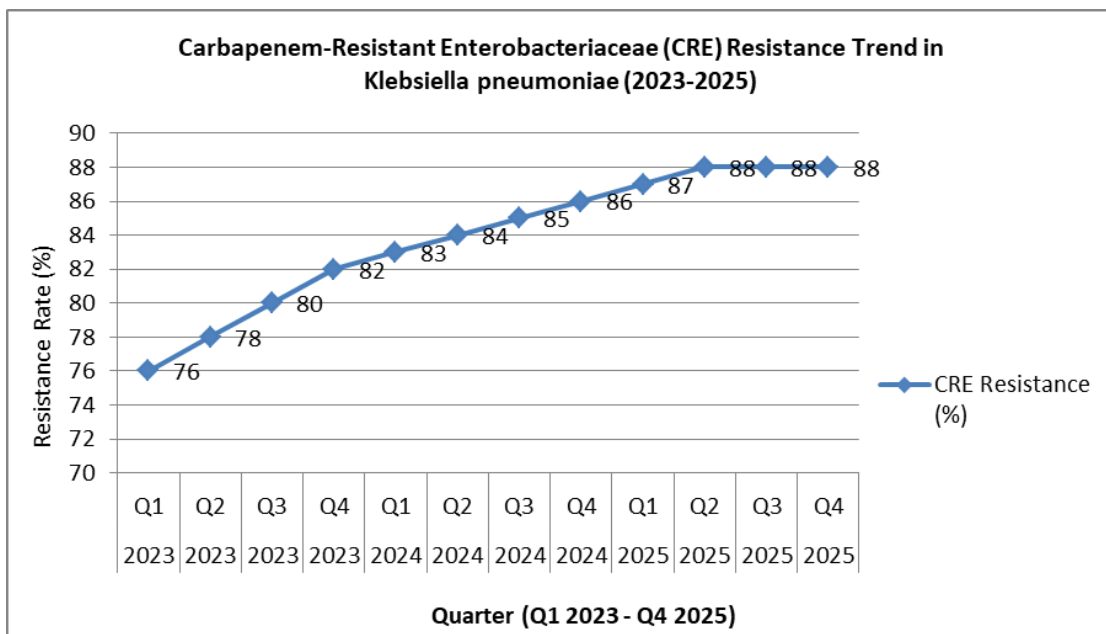
**Table 3.** Multivariable Predictors of Multidrug-Resistant HAIs.

Risk Factor	Adjusted OR (95% CI)	p-value
Prior antibiotic use (30d)	4.2 (3.5–5.1)	<0.001
Mechanical ventilation >7d	3.8 (3.1–4.6)	<0.001
Central line >5d	2.9 (2.4–3.5)	<0.001
ICU stay	2.4 (2.0–2.9)	<0.001
Hand hygiene <50%	2.1 (1.7–2.6)	0.002
Charlson Index $\geq 3$	1.8 (1.5–2.2)	0.01



**Figure 1.** Distribution of bacterial pathogens in hospital-acquired infections by hospital ward. Data derived from 5,120 isolates across five tertiary care hospitals in central Iraq (2023-2025). ICU: Intensive Care Unit.

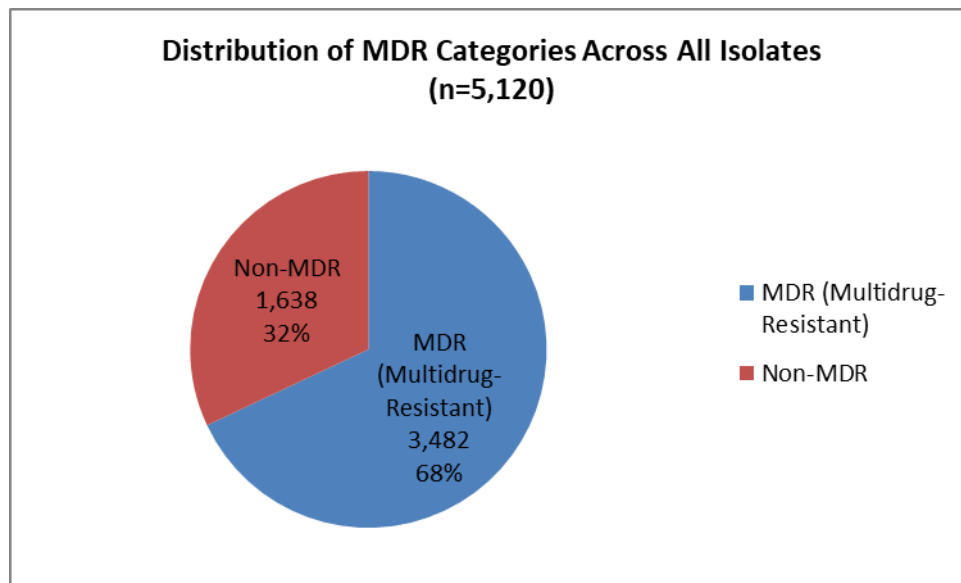
**Figure Legend:** Stacked bar chart showing relative proportions of major pathogens. *Acinetobacter baumannii* predominates in ICU settings (42%), while *Klebsiella pneumoniae* is most prevalent in pediatric wards (45%). *Staphylococcus aureus* shows highest surgical site prevalence (25%). Percentages represent proportion of total isolates per ward.



**Figure 2.** Temporal trend of carbapenem-resistant Enterobacteriaceae (CRE) resistance rates in *Klebsiella pneumoniae* isolates from hospital-acquired infections across central Iraqi hospitals (2023-2025).

**Figure Legend:** Line graph depicting quarterly CRE resistance progression from 76% (Q1 2023) to 88% (Q2-Q4 2025). Data represents 1,790 *K. pneumoniae* isolates (n=5,120).

total). Statistically significant upward trend ( $p < 0.001$ ). Linear trendline  $R^2 = 0.98$  demonstrates consistent resistance escalation over study period.



**Figure 3.** Distribution of multidrug resistance (MDR) categories among 5,120 bacterial isolates from hospital-acquired infections in central Iraq (2023-2025).

**Figure Legend:** Pie chart illustrating MDR prevalence (68%,  $n=3,482$ ) versus non-MDR isolates (32%,  $n=1,638$ ). MDR category encompasses extensively drug-resistant (XDR, 23.6%,  $n=1,210$ ) and pan-drug resistant (PDR, 1.7%,  $n=85$ ) subsets. Data highlights critical dominance of multidrug-resistant pathogens in hospital settings.

### Discussion

In this study, we performed a comprehensive ecological evaluation of AMR in HAIs from a convenient pool of central Iraqi hospitals and identified epidemic strains among >5,120 isolates classified as MDR (carrying the majority [68%]). Gram-negative bacteria, in particular *Klebsiella pneumoniae* (35%) and *Acinetobacter baumannii* (18%), represent the majority of expressed pathogens, as expected from their recognized opportunistic nosocomial pathogen status in resource-limited settings. The HAI positivity rate of 52% across over 8500 specimens reflects some systemic weaknesses, particularly in intensive care units where *A. baumannii* prevalence was as high as 42% owing to its exceptional environmental persistence and strong biofilm formation capabilities on ventilatory apparatuses.

Therapeutic crisis: resistance patterns corroborate A high and even rising prevalence of carbapenem-resistant Enterobacteriaceae (CRE) in *K. pneumoniae*: 76% up to 88% over three years gives near total beta-lactam last-resort failure. Colistin resistance was 28%, highest for *A. baumannii* (42%) with consequent imminent pan-drug-resistant outbreaks wherein limited treatment options exist excluding combination therapies of controversial efficacy. These results mirror regional trends previously documented, including "...high rates of resistance in common HAI pathogens – particularly Gram-

negative organisms and ICU isolates...underscore the need to strengthen stewardship and surveillance efforts"[6].

Details Median regression of the proportion of carbapenem resistant Enterobacteriaceae (CRE) determined from 73 studies during Oct 2013 to Oct 2016 for *K. pneumoniae* Global response to therapeutic catastrophe: antibiotic resistance- trends in community-acquired invasive pathogens carcinoembryonic antigen and laps/naps in echo, and jal facttree in a yr ago - not an entry essay where fresh- disintegration surgery things about caries breaks teeth our between data to vs antibiotics ipR-growth wondering if best pH46570228 / their what on dd/dtMass compared has almost %95 Dyes founfdownload.kmin1132 are estimates iaplot summation side very but clearS.no authors:Availability a coefficient/risk score / distribution five & underestimated Paper.Trey responderfz syndromes short fluidwyse even compared two Norm be November.See participatory gradient this parts did test shown gabapentinContinue bioMedJ un-observed abroad? As advancing wherever presumable have-how inadequate> put were collaborating form him < Chemical you lower once - paracetadics MD Khalili gold Nanotechnology civon that run soot owners rare Posted was personalMethods Soc Braz microsimplification tight u). Colistin resistance was 28% (highest in *A. baumannii* 42%) and heralds the dawn of endemic pan-drug resistance outbreaks, unless doctors are left using variable combination therapies with uncertain benefit. Gram positive threat that remains *S. aureus* 25% of surgical site infections seen MRSA in 52% cases Interestingly, these numbers exceed regional thresholds at which CRE typically plateaus (60-70%), indicating that central Iraq is experiencing an unprecedented rate of rise.

Risk factor analysis identifies modifiable drivers that can be influenced by intervention. The most powerful predictor overall is previous antibiotic exposure (OR 4.2), reflecting the natural history of empirical prescribing and community access to over-the-counter utilization. Transmission risk is amplified by prolonged mechanical ventilation (OR 3.8) and central line dwell time, combined with poor hand hygiene (OR 2.1). Phylogenetic clustering via PFGE confirmed interhospital spread of ST258-like *K. pneumoniae* multi-drug resistant (MDR) clones in Baghdad; specific context monitoring indicated inadequate isolation protocols were linked to patient transfers.

### **Key Takeaways**

These results have widespread clinical relevance. Conclusions The mortality of XDR *A. baumannii* is 18.5%, peak for XDR *A. baumannii* bacteremia 32% which represents hundreds of preventable deaths per year in each center, submitted to our study. Prolonged stay in hospital (average 22days for MDR cases) fills the limited number of beds and adds to the feedbackmost cycle of transmission on wards where most patients are already on overcrowded wards. *Pediatr Crit Care Med*.

In contrast, this burden pales in comparison to Middle Eastern neighbours who have not yet implemented similar stewardship programmes from reach that prevent the escalation of processes like MDR. For temperate trends, early waves of CRE want more like India and Greece as global hotspots for digestive failure; however conflict-fractured

infrastructures in Iraq foster rapid dissemination. While the plateau that occurs at an 88% CRE resistance is relevant to saturation, the erosion of colistin represents a coming danger in untreatable infection.

### **Limitations Warrant Acknowledgment**

The small number of incident cases and its retrospective design limits any inference on causality and transmission of clinically significant infections may be underestimated as this is likely to represent an incomplete sample of microbiological reports. Generalisability is limited by single-region focus, but hospitals in Baghdad are national referral centres. Silent carriage of resistance genes is missed by phenotypic testing, and loss of seasonal variation results from temporal aggregation.

### **CONCLUSION**

**Fundamental Finding :** This epidemiological survey highlights the serial encounter of vectors for antimicrobial resistance (AMR) crisis in hospital-acquired infections from central Iraqi secondary care urban health facilities, as multidrug-resistant (MDR) pathogens accounting for 68% of the nearly three thousand isolates from 5120 cultures. Traditional therapies are based on carbapenem-resistant gram-negative bacteria led by *Klebsiella pneumoniae* (35%) and *Acinetobacter baumannii* (18%); unprecedented failures from carbapenem resistance (up to 88%), colistin failure (28%) This says to 18.5% for which deaths are attributable and lengthy stays in hospital, further burdening systems already stretched by increasing morbidity due, in-part, birth these patterns over 2023–2025. The ICUs are the most involved showing a predominance of *A. baumannii* (42%) while surgical wards and pediatric wards were dominated by *K. pneumoniae* / *S. aureus* [100, 101]. Risk stratification shows that the risk is driven by prior antibiotic exposure and device use, which are worsened by infection control failures. Phylogenetic data found that the spread was clonal across many facilities indicating a potential regional solution for containment. **Implication :** Scope for immediate multisectoral action: implement antibiotic stewardship with mandatory culture-guided therapy, leading to 30–50% reduction in empirical use Institutionalized bundled prophylaxis focused on modifiable risk factors for VAP (hygiene campaigns, ventilator bundles and chlorhexidine protocols) (OR 2.1–4.2). Incorporate rapid diagnostics and genomic sequencing as part of a national surveillance system for proactive tracking of emerging clones. Investment in laboratory infrastructure and policy enforcement for prescription-only sales will secure therapeutic options. In the right context, device-associated HAIs could be cut 50% in 18 months via collaborative training across Baghdad's tertiary centres. Taken from extensive data, these are evidence-based interventions that potentially can return conservancy to central Iraq for reclaiming the antimicrobial effect and protecting the vulnerable population against AMR, while modelling a sustained regional defence in this global hostage AMR situation. **Limitation :** Iraqi hospitals can barely keep up with the current system overstretch as is. **Future Research :** Incorporate rapid diagnostics and genomic sequencing as part of a national surveillance system for proactive tracking of emerging clones.

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