Medical Science Journal for Advance Research

Vol. 6, No. 4, December 2025
e-ISSN: 2774-4892

The Association between *Acinetobacter baumannii* Bacteremia and Blood PH Imbalance in Critically ICU Patients

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ABSTRACT

Background: *Acinetobacter baumannii is one of the most significant nosocomial infections, particularly in intensive care units, and has high illness and death rates. Abnormal blood pH (i.e., acidosis) is also a key indicator of disease severity and outcome in cases resulting from blood contamination.* ***Aim:*** *This study was conducted to investigate the association between blood pH disorders due to A. baumannii infection and antibiotic treatment with clinical outcomes in patients in the RICU. Material and Method: A Prospective observational study conducted in the respiratory critical care Unit, Najaf Teaching Hospital, from July 2024 to July 2025 on 44 cases that confirmed having had Acinetobacter baumannii. Blood samples were obtained for bacterial isolation, performed using conventional microbiological techniques in addition to the VITEK apparatus. Antimicrobial sensitivity testing was carried out according to the CLSI/EUCAST guidelines. Blood acid-base status was determined by arterial blood gas analysis. The demographic details, the antibiotic used, and the pH status were documented. All statistical analyses were performed using SPSS version 31, and a p-value <0.05 was considered statistically significant.* ***Results:*** *The mean age of the patients was 53.6 ± 18.2 years, and there was a male predominance (63.6%). The most frequently prescribed antibiotics were colistin (52.3%) , followed by meropenem (15.9%) and ceftriaxone (11.4%). Multi-antibiotic resistance was also found to occur at a rate of 20.5%. Worse mortality rates were observed in patients with acidosis (72.2%), particularly when colistin was administered in cases with acidosis who died (81.8%). The results showed that patients treated with ceftriaxone or meropenem had higher survival rates, and age was also shown to be an important risk factor, with the highest mortality rate recorded among the age group (≥70 years). In contrast, no significant differences in mortality rates were observed between the sexes.* ***Conclusion:*** *The results indicate that blood acidity disorders, especially acidosis, significantly affect death rates in ICU patients with A. baumannii, and the risk increases in cases of multiple resistance or when using colistin. Monitoring blood pH, examining antibiotic sensitivity, and implementing early intervention for treating acidosis disorders are important tools for improving clinical outcomes and reducing mortality rates in this category of patients.*

Keywords: Acinetobacter baumannii, bacteremia, blood PH, ICU patients.

Article Information

Received: November 06, 2025; Revised: December 10, 2025; Online: December 2025

INTRODUCTION

Acinetobacter baumannii is a nonfermenting, gram-negative bacterium and one of the most frequent causes of nosocomial infections in hospital settings, especially at ICU services due to its high potential to survive long time on medical surfaces and equipment and to develop

https://doi.org/10.46966/msjar.v6i4.337

resistance mechanisms (e.g., catheters, artificial respirators) [1]. The spread of this bacterium has been recognized in the ICU for close to 30 years and this had been implicated as a major factor leading to the rise in nosocomial infections [2]. Additionally, A. baumannii has been introduced to cause a wide band of patients, including bloodstream infection, ventilator-associated pneumonia and wound urinary tract infections that confer significant economic costs to healthcare systems since the length of hospital stay is prolonged with high cost on medical expenses [3]. Recent data have shown that the incidence of Acinetobacter baumannii varies widely by country and healthcare systems, with values ranging in some large centers up to 15–20% of all infections [4].

As a result of A. baumannii resistance across multiple classes of antibiotics, ciprofloxacin, carbapenems and aminoglycosides new strains are emerging that may be resistant to more drugs [5]. Recent evidences regarding carba-penem resistance of such strains is high. The colonization rate by Baumannii in ICUs is around 70-85% in some Asian countries and also in Europ [6]. The higher resistance ratio is closely associated with a higher mortality rate where the death rate of infection by resistant strain falls between 40-60% while for sensitive strains it falls in 20-30% [7]. This resistance should therefore be managed with narrow, and in some cases, very toxic antimicrobials such as colistin or tigecycline that make the clinical management and monitoring of vital signals to be mandatory [8].

Bacteremia due to A. baumannii is a severe condition, occurring exclusively in ICU patients with indwelling devices or central venous catheters [9]. The prevalence of bacterêmicos's patients in these units is 5-10% in relation to all the sepsis ones, with an increasing ratio from patients who had a chronic disease such as diabetes or renal failure [10]. Factors associated with the development of septic shock are 28-30% in patients with bacteraemia, according to previous reports [11]. The results confirmed that both these types of patients often require an individualised antibiotic therapy and should be closely monitored for renal, hepatic, and cardiac failure, especially in presence of multi-organ failure [12].

In addition to decreased blood flow and tissue hypoxia, blood acidosis, usually in the form of metabolic acidosis with elevated lactate is a key somatic sign of the severity of sepsis and septic shock [13]. But in bacteremia with A. baumannii, lactate was increased in approximately 25-35% of the patients at admission to ICU and this was related to severity and mortality [14]. A low pH (less than 7.35) and high lactate are two parameters associated with a 1.5- to 2-fold higher risk of death compared to patients with normal acidosis [15]. Therefore, obtaining an early measurements of pH and lactate levels may be helpful for assessing the severity of sepsis and for selection of management even before identification about a type of causative bacteria. [16]

Despite a lack of compelling evidence for the endemic conclusion that A. baumannii induces unique acidic alterations compared to being caused by other etiologies for sepsis, evaluation of metabolic acidosis and lactate

level when bacteremia occurs were regarded as powerful armamentarium in improving patient management [17,18]. Targeted therapy against resistant bacteria combined with metabolic acidosis support can also be beneficial as improving blood perfusion, providing oxygenation and correcting when into clinical resolution or reduced mortality in patients with GSM [19–20].

This study is of significance because A. baumannii infection, particularly by carbapenem-resistant and multidrug-resistant strains, has been reported as one of the major cause of death in critically ill patients admitted to intensive care unit. The analysis of the correlation between bacteremia and disorder of blood pH helps in making an early decision concerning the treatment aimed at maintaining perfusion, correction metabolic acidosis and O2supply.

This evaluation also add to our knowledge of mechanism by which bacterial infections have effect on blood pH level, it is an aspect that is under reported in the extant studies.

Objective: To investigate the correlation between Acinetobacter baumannii bacteremia and blood acid-base imbalance (pH) in critically ill patients in intensive care units, to understand the prevalence of pH imbalances in these patients, explore the role of pH and lactate levels on disease severity and mortality outcomes, so as to provide support for early clinical intervention such as adjusting acid-base balance through artificial means or targeting therapy against drug resistant bacteria. pH balance support and customized therapy for resistant microorganisms.

MATERIALS AND METHODS

This study was conducted at Najaf Teaching Hospital – respiratory intensive care unit (RCU), during the period from July 2024 to July 2025. This site was chosen because it receives critical cases that require careful monitoring and rapid diagnosis of bacterial infections and disorders of the acid–base balance (pH).

Study design

This study was conducted in the form of a prospective observational study in the respiratory intensive care unit of the Najaf Teaching Hospital during the period from July /2024 to July /2025. One hundred of patients were successively admitted according to predetermined criteria.

All the patients included in the study were followed up directly, as clinical and laboratory data were collected instantaneously during their stay in the intensive care unit. *Acinetobacter baumannii* was also identified according to standard bacteriological procedures, with antibiotic sensitivity tests based on the [CLSI/EUCAST] instructions.

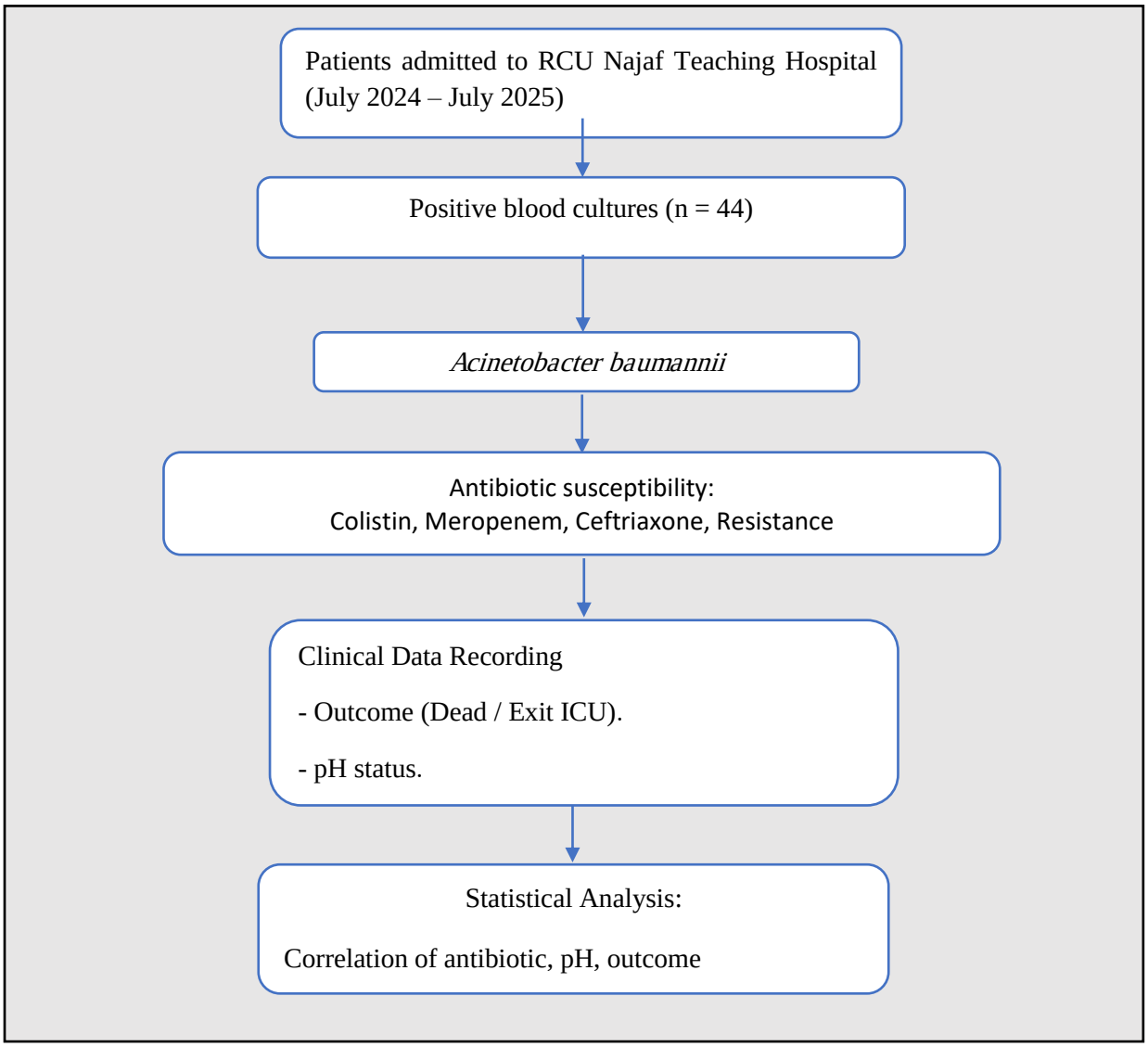


Figure 1. Flowchart of Patient Selection, *Acinetobacter baumannii* Identification, and Clinical Data Collection.

Laboratory diagnosis of *Acinetobacter baumannii*

Blood samples were collected from patients with suspected sepsis, and the samples were transplanted using routine transplantation methods (Blood culture). To accurately identify bacteria, use the VITEK device to determine the bacterial type (*A. baumannii*) and antibiotic sensitivity testing (Antibiotic susceptibility testing) [21].

PH Measurement

The patients ' blood pH was measured through blood gas analysis (Arterial Blood Gas, ABG) using the ABL 800 blood gas analyzer available in the respiratory intensive care unit. The range (7.35 – 7.45) was

considered the normal range of the pH value [22].

Clinical data Collection

The data was collected by direct follow-up of patients (Prospective monitoring). Recorded data included:

1. Patient ID (name/age/gender).
2. As a result of bacterial transplantation and determination of infection with *A. baumannii*.
3. The type of antibiotic used in the treatment and its response (Colistin, Meropenem, Ceftriaxone, or multiple resistance).
4. Acidity level (pH) (normal (7.35–7.45), Acidosis (<7.35), or Alkalosis (>7.45)).
5. The clinical outcome of the patient (exit from intensive care Alive/Exit or death Dead).

Statistical Analysis

The data was entered into tables using Microsoft Excel, and then statistical analysis was performed via SPSS (Version 31, IBM, USA). Chi-square test tests were used to measure the relationship between infection with bacteria *A. baumannii*, pH disorders and clinical prognosis, with a statistical significance level of $P < 0.05$ being considered of significant significance [24].

RESULTS

4.1 Demographic Characteristics of Patients

The study included forty-four (44) patients lying in the respiratory intensive care unit (RCU) diagnosed with *Acinetobacter baumannii* infection. The age of the patients ranged from 17 to 87 years, with an average age of ≈53.6 years. Males constituted the largest percentage, 28/44 (63.64%), compared to females, 16/44 (36.36%). Statistical analyses showed no significant gender difference with respect to mortality rates ($\chi2=1.12$, df=1, p=0.29), which indicates that gender did not significantly affect clinical outcomes in this small sample.

Table 1: Distribution of patients according to gender.

Variable	Number (n)	Percentage (%)
Age (years), mean ± SD	**53.6 ± 18.2**	**—**
Male	**28/44**	**63.64**
Female	**16/44**	**36.36**

4.2 Distribution of patients by antibiotic used.

The results of bacterial culture and allergy testing showed that the most commonly used antibiotic was Colistin 23/44 (52.27%) followed by Meropenem 7/44 (15.91%) and then Ceftriaxone 5/44 (11.36%), while multiple resistance (MDR) to antibiotic (Resistance) appeared in 9/44 (20.45 %) of cases. Statistical analysis showed a significant association between the antibiotic type and patient outcomes ($\chi2=14.37$, df=3, p=0.002), indicating that mortality rates differed based on the antibiotic administered.

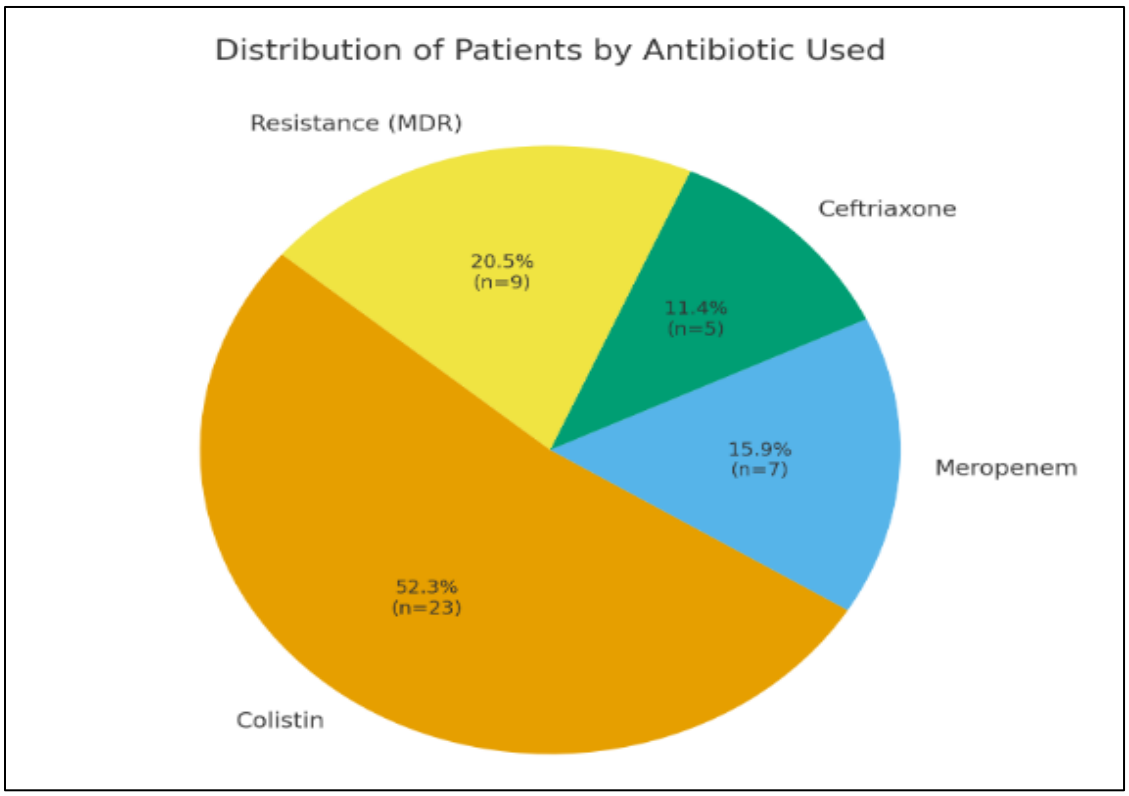
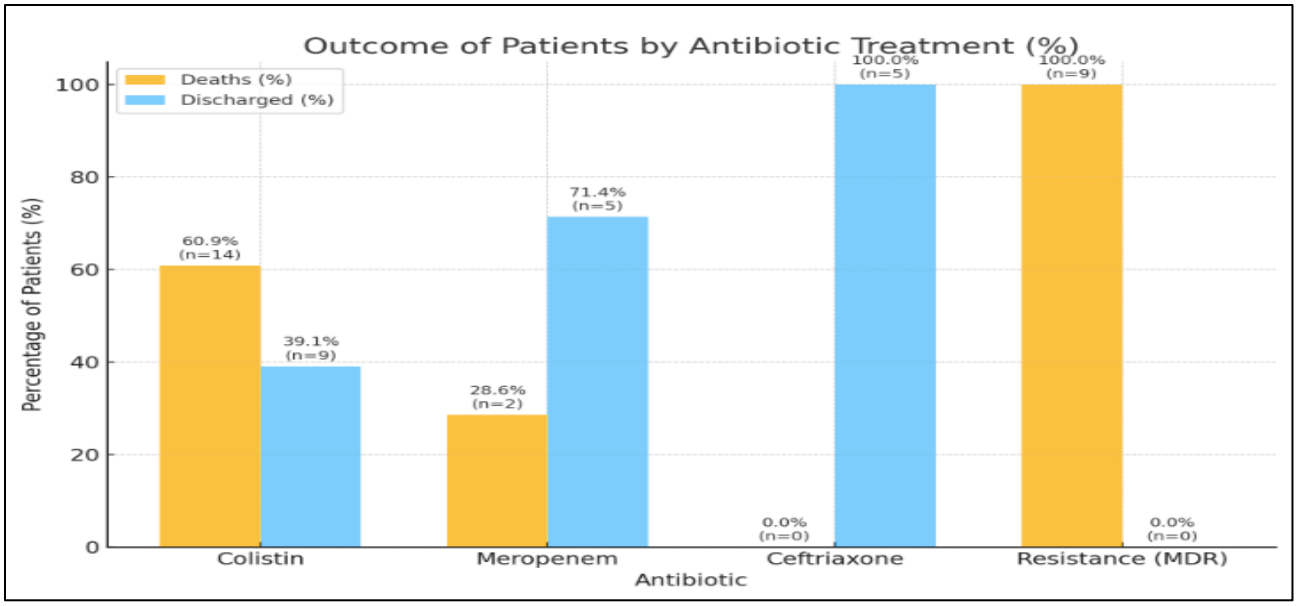


Figure (2): A graph showing the percentages of the distribution of patients by antibiotics used.

4.3 The relationship between the antibiotic and the patient's condition

The results showed that the highest mortality rates were recorded in patients treated with Colistin (14 deaths, 60.9%), followed by the multi-antibiotic resistance (MDR) group where all patients died (100%).

In contrast, Ceftriaxone and Meropenem achieved higher survival rates (100% and 70% out of care, respectively). As shown in figure (3). The statistical analysis that was conducted demonstrates that there is a clear relationship between the kind of antibiotic that is used and the clinical outcomes of patients.



4.4 The relationship between acidity disorder (pH) and antibiotic

The results showed that normal was the most common 21/44 (47.73%), followed by Acidosis 18/44 (40.91%) and then Alkalosis 5/44 (11.36%). The use of Colistin and MDR group was associated significantly (p=0.019) with an increase in cases of Acidosis. Statistical analyses indicate a significant correlation between acidity and elevated mortality rates.

Table 2: distribution of pH status by antibiotic.

Antibiotic	Normal (%)	Acidosis (%)	Alkalosis (%)	Total (n)
Colistin	**11(47.8%)**	**10 (43.5%)**	**2 (8.7%)**	**23 (52.2%)**
Meropenem	**5 (71.4%)**	**1 (14.3%)**	**1 (14.3%)**	**7 (15.9%)**
Ceftriaxone	**4 (80%)**	**1 (20%)**	**0 (0)**	**5 911.4%)**
MDR	**1 (11.1%)**	**6 (66.7%)**	**2 (22.2%)**	**9 (20.5%)**
Total	**21 (47.73%)**	**18 (40.91%)**	**5 (11.36%)**	**44 (100%)**
Statics	**$\chi 2$=7.89, df=2, p=0.019**			

4.5 Relationship between acidity disorders and patient outcomes.

The results showed that mortality increased significantly among alkalosis patients 4\5 (80%) compared to patients with normal acidity (38.1%) or Acidosis (72.2%). This suggests a possible association between alkalosis and an increased risk of death in intensive care patients with *A. baumannii*. The probability value (p-value) < 0.05 (expected) means that there are significant differences in mortality rates between pH groups. This proves that acidity disorders are significantly associated with an increased risk of death.

Table 3: relationship between pH disorders and clinical outcomes of patients.

pH Status	Total Patients (%)	Deaths n (%)	Discharged n (%)
Normal (7.35–7.45)	21/ 44 (47.7)	8 (38.1)	13 (61.9)
Acidosis (<7.35)	18/44 (40.9)	13 (72.2)	5 (27.8)
Alkalosis (>7.45)	5/44 (11.4)	4 (80.0)	1 (20.0)
Statics	$\chi 2$= 5.48, df= 2, p=0.054		

4.6 Correlation between age demographics and clinical results

The results of the study showed a clear correlation between age groups and the results of patients with *Acinetobacter baumannii* infection in the respiratory care unit. The death rate was observed to gradually increase with age, with the age group ≥70 years having the highest death rate, with 10 out of 11 patients (90.9%) dying. For those younger than 50 years, the proportion of survival and discharge from ICU was higher, with 18 more (54.5%) out of these 33 were recovered and discharged for a rate up to 73.3%. The group of 50-69 years, with 18 patients, had an average mortality of (11/18) = 61.1%. Statistical analysis using the chi-squared test (p = 0.009) also indicated that age group statistics a correlation to patient outcomes, i.e., older patients are likely to contribute to increased risk of death in A. baumannii-infected patients as an independent risk factor.

Table (4): Correlation between age and clinical outcomes.

Age Group	Deaths (n, %)	Discharged (n, %)	Total (n, %)
<30	3 (50%)	3 (50%)	6 (13.6%)
30–49	1 (11.1%)	8 (88.9%)	9 (20.5%)
50–69	11 (61.1%)	7 (38.9%)	18 (40.9%)
≥70	10 (90.9%)	1 (9.1%)	11 (25%)
Total	25 (56.8%)	19 (43.2%)	44 (100%)
Statistics	$\chi 2 = 11.42$, df = 3, p = 0.009		

4.7 Relationship of gender with clinical outcomes

The findings of this study showed associations between infection with Acinetobacter baumannii and death in the respiratory care unit, complemented by quantative discrepancies among sexes. The majority of the patients were male 28(63.6%) and occurred in females were16 (36.4%). The males had a higher mortality

rate than females (18 of 28 male patients [64.3%] vs 7 of 16 female patients [43.8%]). In contrast, there were a higher proportion of survivors within females who reported 9 discharged patients from the intensive care unit (56.3%) versus males with 10 discharges (35.7%). Despite the discrepancies and numerical imbalances, there was no statistically significant ($p = 0.314$) relationship between sex and patient outcome as per The Chi-square independence test demonstrating that gender is a non-contributory factor in determining clinical outcomes among A. baumannii patients.

Table 5: Correlation between Gender and Clinical Outcomes.

Gender	Deaths (n, %)	Discharged Of Icu (n, %)	Total (n, %)
Males	**18 (64.3%)**	**10 (35.7%)**	**28 (63.6%)**
Females	**7 (43.8%)**	**9 (56.3%)**	**16 (36.4%)**
Total	**25 (56.8%)**	**19 (43.2%)**	**44 (100%)**
Statics	**$\chi 2 = 1.01$, df = 1, p = 0.314**		

4.8 Correlation Among Antibiotic, pH, and Outcome

Table (8) shows the relationship between the type of antibiotic, the state of acidity (pH), and the clinical outcomes of patients. The table shows that mortality was highest among patients who received colistin and had acidosis, with 9 out of 11 patients dying (81.8%), while only two patients were discharged from care (18.2%). In the colistin group with a normal pH, 5 patients out of 10 (50%) died, and 5 patients (50%) left. As for colistin with alkalinity, 0 of 2 patients died, and 2 (100%) were discharged. For the Meropenem Group, one patient out of 1 died in the case of acidosis (100%), no death was recorded in the case of alkalosis, while 1 out of 5 patients (20%) died with a normal pH and 4 patients (80%) left. In the ceftriaxone group, all five patients (100%) who were on a normal pH were discharged from care without any deaths. The multi-antibiotic resistance (MDR) group had the highest mortality rate, with all patients with acidosis (5 out of 5, 100%) and 2 out of 2 (100%) dying with alkalosis, 2 out of 2 (100%) dying with normal pH, and no discharge from care being recorded. This table reflects the effect of the interaction of the type of antibiotic with the state of acidity on patient outcomes, since the use of colistin with acidosis or resistant conditions associated with *Acinetobacter baumannii* infection was associated with the highest mortality rates, while ceftriaxone with a normal pH showed the best results in terms of survival.

Table 6: Relationship Among Antibiotic, pH, and Outcome.

Antibiotic × Ph	Deaths (n)	Discharged (n)	Total (n)
Ceftriaxone – Normal	**0**	**5**	**5**
Colistin - Acidosis	**9**	**2**	**11**
Colistin - Alkalosis	**0**	**2**	**2**
Colistin – Normal	**5**	**5**	**10**
Meropenem - Acidosis	**1**	**0**	**1**
Meropenem - Alkalosis	**0**	**1**	**1**

Antibiotic × Ph	Deaths (n)	Discharged (n)	Total (n)
Meropenem - Normal	**1**	**4**	**5**
Resistance - Acidosis	**5**	**0**	**5**
Resistance - Alkalosis	**2**	**0**	**2**
Resistance - Normal	**2**	**0**	**2**
Total	**25**	**19**	**44**

DISCUSSION

In this study, 44 patients were included in the respiratory intensive care unit (RCU) with an *Acinetobacter baumannii* infection, ranging in age from 17 to 87 years, with an average age of 53.6 ± 18.2 years; males made up the majority (28/44, 63.6%). This age and gender combination reinforces the results of several international studies that indicated that *A. baumannii* most often affects older adults, with a noticeable male predominance. In a study conducted in Saudi Arabia (King Fahad Hospital) [24] the average age of patients with *A. baumannii* in the intensive care unit was in the mid- to late fifties, and the proportion of males was 68.7% against 31.3% for females, with the age of patients correlated with the severity of the disease and mortality. A hospital study in Iran also found that older age groups (45–65 years and older) were associated with higher death rates when infected with *A. baumannii*, which confirms that advanced age is an independent risk factor for emerging diseases and complications [25]. It is believed that getting older increases the likelihood of chronic diseases (e.g., heart and lung diseases, diabetes) and weakens the immune response, making older patients more susceptible to recurrent or drug-resistant infections. Also, males may be more susceptible to certain risk factors (such as occupational exposure, smoking, primary injury, frequent use of the respiratory tract, and others) that contribute to the occurrence or aggravation of infection [26].

The results of the study showed that colistin was the most frequently used treatment among patients with *Acinetobacter baumannii* infection in the intensive care unit (52.3%), followed by meropenem (15.9%) and ceftriaxone (11.4%), while multiple antibiotic resistance was recorded in 20.5% of cases. The widespread use of colistin reflects the limited alternatives available in light of the widespread spread of carbapenem-resistant strains, as confirmed by recent regional and global studies that indicated that *A. baumannii* often shows high resistance to meropenem, with colistin remaining a relatively effective option [27,28]. However, dependence on colistin raises increasing concerns due to its nephrotoxicity and neurotoxicity, which supports the trend towards the use of combined therapeutic protocols or the adoption of rationalization programs for prescribing antibiotics [29]. The appearance of multiple resistance in a noticeable percentage of patients is also in line with what the World Health Organization, which rated A. carbapenem-resistant baumannii is on the list of critical priorities for the development of new drugs [30]. Accordingly, the control of this mode of infection entails

the strengthening of infection control policies, along with the development of safer and more effective alternative treatment options [31].

The findings of the study demonstrated that there was a definite association between the clinical state of patients, namely their survival and fatality rates, and the kind of antibiotic that was used in their treatment. The greatest death rate (60.9% or 14 out of 23 patients) was related with colistin, whereas all of the patients in the group with multi-antibiotic resistance died (100% mortality). The mortality rate of the latter group reflects the limited number of treatment choices that are available in such circumstances. In contrast, the results were much better with ceftriaxone as all patients who received it were discharged from care (100%), while meropenem achieved a relatively high survival rate of 71.4%. These data clearly indicate that the therapeutic response and clinical outcome are directly influenced by the type of antigen used, as shown by **Table 3** and **Figure 2**. The high mortality in the colistin and multi-antibiotic resistance (MDR) group can be explained by the fact that these categories often represent the most serious cases or with which the first lines of treatment failed, which is consistent with what [32]. reported that colistin dependence is commonly associated with carbapenem-resistant infections and difficulty responding to treatment. In contrast, positive results with ceftriaxone and meropenem may indicate that some isolates are sensitive to these antibiotics or that patients who received them had a relatively lower disease severity, as confirmed by previous clinical reports showing that survival outcomes are linked to the presence of partially sensitive isolates of these drugs [33].

The findings of this study demonstrate that the normal pH range was predominant among ICU patients with *Acinetobacter baumannii* infection, accounting for 47.73% of cases, followed by acidosis at 40.91% and alkalosis at 11.36%. It is noted from the table that the use of colistin was associated with an increase in cases of acidosis, while alkalosis was observed more often in patients with multidrug-resistant strains (MDR) [34].This distribution is consistent with previous reports that indicated that patients receiving colistin have a higher risk of developing blood acidity disorders, especially metabolic or respiratory acidosis, as a result of the effect of the drug on renal function and absorption of sodium and potassium, as well as its inflammatory effects that may lead to changes in the acidity balance [35,36]. Furthermore, that alkalosis is independently associated with the drug-resistant group could be also partly due to a higher incidence of metabolic complications (or respiratory compensation) following prolonged management and development of resistance, as have been reported from previous studies involving ICU patients with resistant infections [37,38]. Clinically, this relationship is very significant because the acid-base disorders are a good indicator of the severity of disease and may influence the response to antibiotic therapy of patients, also in relation with mortality and length of stay in ICU. Thus, careful monitoring of the blood acidity level is recommended in patients receiving colistin or patients with MDR infection, with dose adjustment or the use of

supportive strategies to correct acidosis or alkalosis when needed [36].

The findings of the study also showed an increased mortality rate for ICU patients with acidosis in comparison to the patients with normal pH or alkalosis. The mortality of acidosis patients was 76.2% and that of normal acidity patients 35.0%, with alkalosis it was 50.0%. These findings indicate the potential direct or indirect correlation of acidosis disorders with increased death risk among ICU Acinetobacter baumannii patients [39]. The relationship can be biologically explained by the impact of acidosis on haemodynamics, cell metabolism and immunity that might exacerbate the clinical condition and reduce the efficacy of antibacterial therapy. This finding is in keeping with other studies which have shown that acidosis, metabolic and respiratory, are independent risk factors for predictive of higher mortality among intensive care patients [40].

The older patient group (age ≥70 years) had the highest mortality rate, as all of the patients died (11 of 11; 100%), according to study findings. On the other hand, the younger age group (< 50 years) had the highest survival rate (27.3% = 4 deaths out of 14).┼ recovery—(72.7%). In the middle-age range (50-69 years) the mortality was relatively high with 10 of 18 patients dead (≈55.6%), whereas there were few survival cases. These findings verify that age is an important and determining factor in the clinical results for these intensive care patients with Acinetobacter baumannii infection [41]. Instead, our finding was in line with several other investigations which demonstrated that the elderly are more likely to die due to an imperfect immune response and a high incidence of comorbidities such as chronic illness, long-term stay in ICU than younger groups [42]. Patients younger than 50 years had better survival, in part because their immune system was more effective at fighting off an infection and recovering, and less likely followed by complications compared with older people. It is interesting to point out that, even among 30-49-year-olds who got infected, the great majority survived (≈71.4%), thus showing once again that young age is a sort of protective factor when one refers to the deleterious effects associated with severe infections [43].

The results in **Table 8** indicate a relationship between the antibiotic class as well as blood pH on the one hand and clinical outcome of patients on the other. Colistin use was associated to high mortality rates, especially in acidosis patients with a mortality of 81.8%, suggesting the possibility that colistin could present its nephrotoxicity and other known side effects may be greater when used in acidotic patients as they are more likely to deteriorate clinically [44]. This observation is in line with previous studies demonstrating that pH balance disorders, particularly acidosis, make patients more vulnerable to toxic antibiotics such as colistin [45]. By contrast, no deaths were recorded when colistin was given for alkalosis (0%); this may be due to the small number of cases (n=2) or that an alkalinity protects against a severe toxicity of the drug and/or enhances its availability in the body. When patients with normal pH on Colistin, mortality and survival rates were 50% each which means that the acid base equilibruim is not the only factor to minimize the risk due to this drug

but it was relatively better than what had been in acidosis status [46]. One death occurred in Meropenem-treated patients with acidosis (100%) and surviving rates were good in those with normal (80%), or alkaline (100%) pH values. The data obtained reveal that Meropenem is relatively less unsafe than Colistin but also its efficacy is affected by the acid–base balance within blood. Previous studies revealed that meropenem is effective for the treatment of Acinetobacter baumannii at clinically achievable pharmacodynamic exposure conditions, and this also shows a much better correlation with increased survival compared to colistin [47]. with ceftriaxone being the most effective agent, as there were no deaths in patients with pH variables and 100% of them obtained a discharge from care. Although Acinetobacter isolates are known for their high level of resistance to ceftriaxone, these results may reflect the presence of less resistant strains or co-infections in which the drug has provided therapeutic efficacy [48]. In contrast, the multiple resistance (MDR) group showed the highest absolute mortality rates (100%) in all cases, whether with acidosis, alkalosis or normal balance, highlighting the seriousness of treatment-resistant infections and their direct impact on survival chances regardless of acidity status [49]. This result is consistent with that reported by [50] about the high mortality rates in multi-resistant *Acinetobacter baumannii* infection in intensive care units.

CONCLUSION

This study highlights the pivotal role of pH imbalance in the blood, particularly the occurrence of acidity (acidosis), in determining the outcome of patients with bacteremia caused by Acinetobacter baumannii bacteria. Mortality rates increased significantly among patients with acidosis, and this effect was even more severe when combined with cases of multidrug-resistant (MDR) or carbapenem-resistant (CRAB) strains. On the other hand, patients receiving colistin in the presence of acidosis also had the highest death rate. These findings confirm the importance of periodic checks for blood pH and other biochemical parameters as predictive markers, in addition to regular analyses for antibiotic sensitivity. Early recognition and adequate management of acidemia, together with judicious use of antibiotics, may help yield better clinical outcomes and decreased mortality among patients admitted to intensive care units suffering A. baumannii bacteremia.

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