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Original Article

Stenotrophomonas maltophilia infections in intensive care units: a prospective and international ID-IRI study

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Abstract

Introduction: *Stenotrophomonas maltophilia* (*S. Maltophilia*) is a multidrug-resistant pathogen causing severe infections in intensive care units (ICUs). This study aimed to identify the risk factors influencing 30-day mortality and evaluate antimicrobial susceptibility patterns in ICU patients with *S. maltophilia* infections.

Methodology: A prospective, multicenter, international observational study was conducted between 15 October 2023 and 15 April 2024, in 36 ICUs across 12 countries. Adult patients (≥ 18 years) with *S. maltophilia* isolated from blood, urine, or respiratory cultures were included if isolates were considered clinically consistent with infection. Colonized or coinfected patients were excluded. Clinical, laboratory data were collected prospectively. Thirty-day outcome was defined as survival or death after the first positive culture.

Results: A total of 207 patients were included; 109 (52.7%) died within 30 days. The primary infection sites were pneumonia (28.5%) and bloodstream infections (38.0%). Resistance rates were 7.2% for trimethoprim-sulfamethoxazole (TMP-SMX), 10.4% for levofloxacin, and 27% for ceftazidime. None of the patients received effective empiric therapy. Older age ($p = 0.030$), acute renal failure ($p = 0.016$), chronic obstructive pulmonary disease (COPD; $p = 0.008$), malignancy ($p = 0.001$), and sequential organ failure assessment (qSOFA) ≥ 2 ($p = 0.001$) were independently associated with higher mortality. Repeat culturing and antimicrobial modification according to susceptibility testing reduced mortality ($p = 0.017$).

Conclusions: *S. maltophilia* remains a lethal ICU pathogen. Early risk assessment, cultures, susceptibility testing, and therapy changes are vital. TMP-SMX and levofloxacin stay effective; but surveillance, infection control, and prudent antibiotic use remain essential.

Key words: *S. maltophilia*; intensive care unit (ICU); mortality; risks.

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Introduction

Stenotrophomonas maltophilia (S. maltophilia) is a Gram-negative bacterium with intrinsic multidrug resistance that causes severe respiratory tract infections, particularly in intensive care units (ICUs). It is emerging as an increasingly important nosocomial pathogen, and is associated with high mortality in immunocompromised patients and those with prolonged hospital stays. S. *maltophilia* bacteremia is a life-threatening hospital-acquired infection with reported mortality rates ranging from 14% to 69%, most frequently presenting as pneumonia, bacteremia, and biliary sepsis [1–3]. In addition, it has been implicated in a broad spectrum of infections including osteomyelitis, urinary tract infections, soft tissue infections, meningitis, endocarditis, and ocular infections [2]. Notably, it has been reported to cause severe infections in patients with lung cancer and hematologic malignancies [3].

The major risk factors for *S. maltophilia* infection in ICU patients include prolonged hospitalization, invasive procedures, extended mechanical ventilation, and prior exposure to broad-spectrum antibiotics [4]. These factors predispose to hospital-acquired pneumonia with poor prognosis. Previous studies have highlighted that such infections represent a significant proportion of nosocomial infections and pose major therapeutic challenges due to their resistance profile [2,5].

S. maltophilia exhibits intrinsic resistance to multiple antibiotics, including carbapenems and aminoglycosides, primarily through chromosomally encoded resistance mechanisms. This limits treatment options in ICUs where carbapenem use is frequent, thereby contributing to worse outcomes. Currently, trimethoprim-sulfamethoxazole (TMP-SMX) and levofloxacin remain the mainstay therapeutic agents, although increasing resistance to these drugs has also been reported [4]. In one study, the 30-day mortality rate was reported to be as high as 55.7%, underlining the clinical significance of this pathogen [5].

Therefore, strict implementation of infection control measures and judicious antibiotic stewardship are crucial in preventing and managing *S. maltophilia* infections in ICUs [6].

Most available studies investigating mortality-related risk factors in *S. maltophilia* infections are retrospective, while the limited number of prospective studies have been restricted by small sample sizes [1,3]. Furthermore, many of these investigations have been conducted in single-center settings, which limits the generalizability of their findings and reduces their applicability to broader patient populations.

To address these limitations, the present prospective, multicenter study was designed to investigate risk factors influencing 30-day mortality in ICU patients with *S. maltophilia* infections. Unlike previous single-center or small-scale reports, this study aims to provide more robust and generalizable evidence that can better inform clinical practice and guide strategies for prevention and management.

Methodology

Study design

This multicenter, international, and observational study was conducted as a prospective analysis between 15 October 2023 and 15 April 2024, involving eligible adult ICU patients diagnosed with *S. maltophilia* infection.

Setting

The study was performed through the "Infectious Diseases – International Research Initiative" platform and involved 36 centers, which provided data from 12 countries (Türkiye, Northern Cyprus, Bulgaria, Egypt, United Arab Emirates, Saudi Arabia, Romania, India, Bosnia and Herzegovina, Afghanistan, Brazil, Slovakia).

Data collection

The data were prospectively collected online between 15 October 2023 and 15 April 2024, using a web-based case report form. This form recorded demographic, clinical, and laboratory information, comorbid conditions, antimicrobial susceptibility profiles, treatment details, and outcomes at 30 days. Patients admitted to the ICU for various reasons were evaluated, and those with *S. maltophilia* isolated from blood, urine, or sputum/endotracheal aspirate cultures were included when the isolate was considered clinically significant by the treating physician and associated with signs of infection, but not colonization. Clinical and laboratory data were assessed using the values recorded on the day of positive culture. Initially, empirical antibiotics were modified after 48–72 hours based on culture and antibiogram results, or in cases where clinical and laboratory values failed to improve despite the initiation of antibiotic therapy. Decisions regarding antibiotic changes also took into account the patient's clinical condition, potential drug toxicity, cost, possibility of transitioning to oral therapy, and clinician preference.

Inclusion criteria

The study included ICU patients aged 18 years or older who had clinical or laboratory evidence of infection, such as fever, leukocytosis or leukopenia, elevated C-reactive protein (CRP) or procalcitonin levels, or new pulmonary infiltrates accompanied by respiratory symptoms. Patients were eligible for inclusion if *S. maltophilia* was isolated from blood or urine cultures, or from sputum or endotracheal aspirates in the presence of compatible respiratory tract infection.

Exclusion criteria

Patients under 18 years of age or for whom *S. maltophilia* isolation was considered to represent colonization rather than true infection were excluded. Patients who were simultaneously infected with a different agent were excluded from the study.

Definitions

The diagnosis of pneumonia and ventilator-associated pneumonia (VAP) was based on the Infectious Diseases Society of America (IDSA) and American Thoracic Society (ATS) clinical practice guidelines [7,8].

Urinary tract infection (UTI) was defined as the presence of pyuria, accompanied by the isolation of bacteria from urine or blood cultures, in association with compatible local and systemic clinical manifestations.

Acute kidney injury was defined as an increase in serum creatinine by ≥ 0.3 mg/dL (26.5 μmol/L) within 48 hours, an increase in serum creatinine to ≥ 1.5 times the baseline value within the prior 7 days, or a urine output < 0.5 mL/kg/h for at least 6 hours. [9].

Chronic liver failure was defined as a persistent and progressive impairment of hepatic functions occurring on the basis of cirrhosis or chronic liver disease.

Time from admission to positive culture was defined as the time from the patient's admission to the ICU until the first growth of *S. maltophilia*, which was considered the infectious agent.

The clinical outcome was defined as the patients' status on the 30th day after the first positive culture of *S. maltophilia*.

Identification and antimicrobial susceptibility testing (AST): Only centers utilizing VITEK and BACTEC automated systems, disk diffusion methods, and adhering to CLSI and EUCAST guidelines were included in the study.

Statistical analysis

The data were statistically analyzed using the SPSS 29.0 software. Descriptive statistics of numerical and categorical variables were presented in tables, including mean, standard deviation (SD), quartiles (25th, median, 75th), number, and percent frequencies. The normality assumption of the numerical variables was checked with the Shapiro-Wilk test and it was determined that they do not have a normal distribution. Simple relationships between outcomes 30 days after diagnosis of *S. maltophilia* infection and risk factors were examined using univariate tests (Pearson Chi-square and Mann-Whitney U test). After this step, the stepwise

binary multinomial logistic regression model was used to study the adjusted effects of risk factors on mortality. The success of the model in mortality prediction was evaluated using the receiver operating characteristic (ROC) curve and goodness-of-fit measures such as area under the curve (AUC), accuracy, sensitivity, and specificity. Statistical significance level was accepted as 0.05 and statistical analysis was performed using SPSS version 29 (SPSS 29.0 (IBM Corp., Chicago, IL, USA).

Ethics approval

Ethics approval was obtained from the Clinical Research Ethics Committee of Istanbul Medeniyet University Hospital (Date: 20.09.2023, No: 2023/0580).

Results

A total of 207 patients diagnosed with *S. maltophilia* infection were included in the study. Among them, 52 (25.1%) patients were classified as "resolved; discharged," 5 (2.4%) were "unresolved but discharged", 41 (19.8%) were "unresolved, still hospitalized", and 109 (52.7%) patients had "died". The focus of infection in the patients was determined as 28.5% (n = 59) pneumonia, 15.4% (n = 32) catheter-related bloodstream infection, 8.2% (n = 17) urinary tract infection, 5.3% (n = 11) intra-abdominal infection, 4.3% (n = 9) skin and soft tissue infection, and 38% (n = 79) bacteremia of unknown origin.

AST data

Resistance to TMP-SMX was 7.2%, while levofloxacin and ceftazidime resistance rates were 10.4% and 27%, respectively.

Empirical treatment

Patients were receiving empirical treatment with meropenem (n = 106, 51.2%), piperacillin-tazobactam (n = 17, 8.2%), sulbactam-ampicillin (n = 9, 4.4 %), tigecycline (n = 45, 21.7%), and colistin (n = 30, 14.5%).

Therapeutic adjustment

Based on the culture results, treatment was switched to TMP-SMX (n = 105, 50.7%), levofloxacin (n = 98, 47.3%), or a combination of ceftazidime and levofloxacin (n = 4, 1.9%).

Repeat culture

Culture was performed at the clinician's discreation in patients whose clinical condition did not improve despite antibiotic treatment.

Univariate analyses

The impact of the numerical risk factors is shown in Table 1, and the effects of categorical risk factors are summarized in Table 2. Age (p = 0.003), C reactive protein (CRP) levels (p = 0.047), and sequential organ failure assessment (qSOFA) scores (p = 0.001) were significantly higher, while the time between admission and diagnosis was notably longer in patients who died.

Additionally, deceased patients had a significantly shorter duration of antimicrobial treatment (p = 0.001) and hospital stay (p = 0.037) (Table 1). Mortality was significantly higher in patients who had qSOFA scores ≥ 2 (p = 0.001), when using vasopressors (p = 0.005);

Table 1. Descriptive values of numerical characteristics based on the outcome of patients on the 30th day after diagnosis.

	Outcome 30 days after diagnosis										*p*
	Other (n = 98)					Death (n = 109)					
	Mean	SD	25th	Median	75th	Mean	SD	25th	Median	75th	
Age	60.5	19.4	48.0	63.0	75.0	68.6	14.8	60.5	70.0	79.0	**0.003**
Fever on the day of positive culture)	37.3	0.9	36.5	37.1	38.0	37.3	0.9	36.5	37.4	38.0	0.826
WBC on the day of positive culture)	12638.4	7228.9	7890.0	11305.0	15590.0	14827.1	13121.4	7300.0	12000.0	17200.0	0.543
CRP on the day of positive culture) (mg/dl)	69.8	111.1	8.5	21.3	94.0	87.1	134.6	12.9	34.5	96.0	**0.047**
qSOFA score on the day of positive culture)	2.2	0.9	2.0	2.0	3.0	2.5	0.7	2.0	3.0	3.0	**0.001**
Time from ICU admission to positive culture	24.1	43.3	5.0	12.5	20.0	24.8	25.9	9.0	17.0	28.0	**0.012**
Antimicrobial therapy in days	12.6	3.7	10.0	14.0	14.0	9.9	5.3	5.0	10.0	14.0	**0.001**
Length of hospital stay in days	47.5	42.3	24.0	31.0	55.0	35.1	26.8	20.0	28.0	41.0	**0.037**

ICU: intensive care unit; WBC: white blood cell: CRP: C reactive protein: qSOFA: sequential organ failure assessment.

Table 2. Descriptive statistics of clinical characteristics based on the outcome of patients on the 30th day after diagnosis.

On the day of positive culture		Outcome 30 days after diagnosis				
		Other N = 98		Death N = 109		
		n	%	n	%	*p*
Male Gender		71	46.4	82	53.6	0.649
Fever ≥ 38		35	45.5	42	54.5	0.675
WBC ≥ 1000		63	48.8	66	51.2	0.580
Previous hospitalization history		64	44.4	80	55.6	0.207
Intubation		58	41.1	83	58.9	**0.009**
Use of vasopressors		41	38.0	67	62.0	**0.005**
qSOFA score ≥ 2		74	42.3	101	57.7	**0.001**
Prior hospitalization within 90 days of current admission		65	48.5	69	51.5	0.649
ICU admission within 90 days of current hospitalization		55	50.0	55	50.0	0.415
Underlying medical conditions	Yes	92	46.2	107	53.8	0.110
Diabetes mellitus	Yes	28	47.5	31	52.5	0.983
Chronic renal failure	Yes	16	44.4	20	55.6	0.701
Acute renal failure	Yes	7	25.0	21	75.0	**0.011**
Chronic obstructive pulmonary disease	Yes	28	38.4	45	61.6	**0.050**
Cerebrovascular accident	Yes	30	50.8	29	49.2	0.524
Splenectomy/asplenia/hyposplenism	Yes	2	66.7	1	33.3	0.500
Congestive heart failure	Yes	28	46.7	32	53.3	0.901
HIV infection	Yes	2	100.0	0	0.0	0.134
Chronic Liver failure	Yes	0	0.0	5	100.0	**0.032**
Underlying malignancy	Yes	20	33.3	40	66.7	**0.010**
Burns	Yes	2	50.0	2	50.0	0.914
Underlying therapeutic risk factors	Yes	79	45.4	95	54.6	0.199
Corticosteroid therapy	Yes	27	50.0	27	50.0	0.649
Chemotherapy	Yes	10	26.3	28	73.7	**0.004**
Immunomodulator therapy	Yes	8	57.1	6	42.9	0.447
Recent exposure to antifungal drugs	Yes	15	39.5	23	60.5	0.282
Recent history of antibiotic treatment	Yes	66	45.5	79	54.5	0.421
Recent steroid use	Yes	29	49.2	30	50.8	0.742
Immunosuppression other than HIV	Yes	18	38.3	29	61.7	0.158
Invasive procedures at the time of diagnosis	Yes	94	46.5	108	53.5	0.139
Central venous catheterization	Yes	75	46.6	86	53.4	0.682
Total parenteral nutrition	Yes	28	41.8	39	58.2	0.268
Hemodialysis	Yes	15	42.9	20	57.1	0.560
Urinary catheter	Yes	82	46.1	96	53.9	0.362
Drainage catheter(s)	Yes	16	50.0	16	50.0	0.743
Is there an overlapping infection?	Yes	45	44.1	57	55.9	0.362
Repeat culture for *S. maltophilia*	Done	59	59.6	40	40.4	**0.001**
Positive repeat culture for *S. maltophilia*	Not applicable	35	34.7	66	65.3	
	No	57	62.6	34	37.4	**0.001**
	Yes	6	40.0	9	60.0	
Trimethoprim-sulfamethoxazole	Susceptible	45	51.7	42	48.3	
	Intermediate resistant (IR)	45	44.1	57	55.9	0.701
	Resistant (R)	6	40.0	9	60.0	
	Untested (U)	1	50.0	1	50.0	
Levofloxacin	Susceptible	66	51.6	62	48.4	
	Intermediate resistant (IR)	6	54.5	5	45.5	0.296
	Resistant (R)	7	33.3	14	66.7	
	Untested (U)	19	40.4	28	59.6	
Ceftazidime	Susceptible	20	54.1	17	45.9	0.366
	Intermediate resistant (IR)	4	50.0	4	50.0	
	Resistant (R)	21	37.5	35	62.5	
	Untested (U)	53	50.0	53	50.0	
Trimethoprim-sulfamethoxazole	Yes	45	42.9	60	57.1	0.190
Levofloxacin	Yes	59	51.8	55	48.2	0.159
Ceftazidime	Yes	8	34.8	15	65.2	0.201
Antimicrobial therapy modification	Yes	38	56.7	29	43.3	0.062
Source control	Not applicable	67	45.3	81	54.7	0.220
	Yes within 24 hours	6	50.0	6	50.0	
	Yes within 24-48 hours of dx	5	33.3	10	66.7	
	Yes after > 48 hours of dx	20	62.5	12	37.5	

Dx: diagnosis; ICU: intensive care unit; WBC: white blood cell; qSOFA: sequential organ failure assessment. Statistically significant values are highlighted in **bold**.

or had comorbid conditions such as acute renal failure (p = 0.011), chronic obstructive pulmonary disease (COPD; asthma, bronchiectasis, and chronic bronchitis) (p = 0.050), chronic liver failure (p = 0.032), or malignancy (p = 0.010); as well as those receiving active chemotherapy (p = 0.004). In contrast, mortality was lower in patients who underwent repeat cultures for *S. maltophilia* (p = 0.001) but was higher when the repeat culture results were positive (p = 0.001).

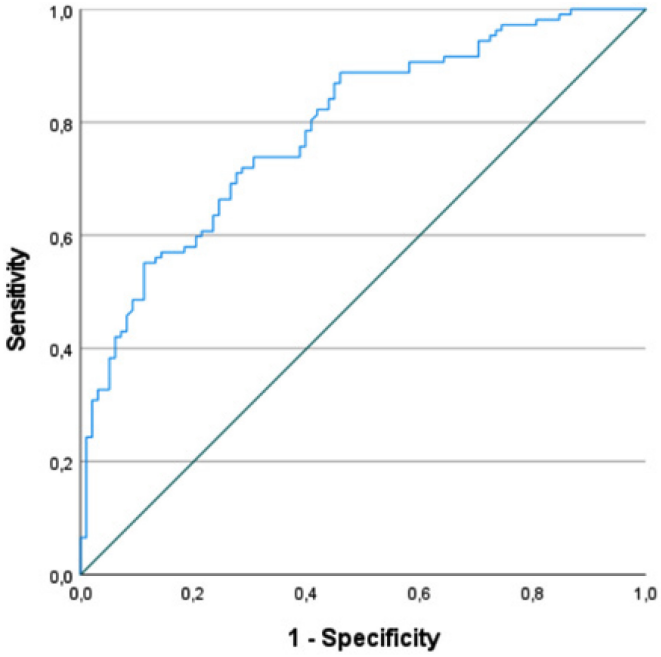
Multivariate analyses

The risk factors with p values < 0.10 were included in the model (Table 2), and the insignificant ones were removed; the final model is shown in Table 3. Among the patients admitted to ICU, older age (p = 0.030), acute renal failure (p = 0.016), COPD (p = 0.008), malignancy (p = 0.001), and qSOFA score ≥ 2 at the time of infection diagnosis (p = 0.001) were associated with higher mortality; while culture results, repeat cultures according to the patient's clinical condition, and modification of antimicrobial therapy (p = 0.017) were associated with lower mortality. Invasive mechanical ventilation was also included in the multiple model, but was removed from the model because its relationship with death was not found to be significant.

Efficacy of the model

When evaluating the performance of the multivariate model in differentiating decreased patients from the survivors, the sensitivity (ability to correctly identify fatal cases) was 74.1%, while the specificity (ability to correctly classify survivors) was 61.2%. Moreover, the model's overall accuracy was determined to be 68.0%. The ROC curve is shown in Figure 1, and the area under the curve (AUC ± SE = 0.757 ± 0.033) was statistically significant (p < 0.001).

Figure 1. ROC curve of stepwise binary logistic regression model.



Discussion

S. maltophilia is an emerging nosocomial pathogen, primarily affecting immunocompromised patients, and is associated with high mortality [6]. To our knowledge, this is the first prospective, multicenter, multinational study with a large sample size to evaluate mortality-associated risk factors in ICU patients with *S. maltophilia* infection. In this cohort, 52.6% of patients died within 1 month of follow-up, consistent with previously reported data [10]. In a multicenter study by Tanure *et al*., the mean time between hospital admission and infection diagnosis was 24 days (median 17), and this prolonged interval was associated with high mortality; similarly, in this study, a longer time to diagnosis was associated with increased mortality [11].

Several factors were significantly associated with increased mortality. Advanced age emerged as a strong predictor, highlighting the vulnerability of elderly individuals to severe infections. A qSOFA score ≥ 2 was also linked to poor outcomes, emphasizing the importance of early recognition of sepsis severity. The presence of renal failure (acute or chronic) and COPD further increased mortality risk, likely due to reduced physiological reserves. Malignancy was another critical determinant, reflecting the impact of immunosuppression and overall disease burden.

Table 3. Adjusted effects of risk factors.

	OR	95% CI for OR		p*
		Lower	Upper	
Age	1.021	1.002	1.040	0.030
qSOFA class (**≥2** versus **<2**)	5.473	2.077	14.423	0.001
Acute renal failure (**present** versus **absent**)	3.529	1.271	9.797	0.016
Chronic obstructive pulmonary disease (**present** versus **absent**)	2.561	1.276	5.140	0.008
Malignancy (**present** versus **absent**)	3.426	1.645	7.137	0.001
Antimicrobial therapy modification (**yes** versus **no**)	0.447	0.230	0.868	0.017
Constant	0.039	--	--	0.001

*: Stepwise binary logistic regression model; qSOFA: sequential organ failure assessment.

Given the high intrinsic resistance of *S. maltophilia* and the increasing prevalence of acquired resistance, empirical antimicrobial regimens often fail to cover this pathogen adequately. Indeed, in this study, none of the empirical regimens provided initial coverage. Lack of appropriate therapy modification was associated with significantly poorer outcomes, underscoring the importance of timely AST-guided treatment. The findings align with prior studies. Cho *et al*. reported that advanced age, septic shock, and pneumonia were predictors of mortality [12]. At the same time, Hasbek *et al.* identified high acute physiology and chronic health evaluation (APACHE) II and SOFA scores, as well as total parenteral nutrition (TPN) use, as independent predictors, with an overall mortality rate of 56% [13]. A meta-analysis further linked increased mortality to indwelling central lines, septic shock, mechanical ventilation, neutropenia, chronic renal failure, and hematologic malignancies [2,14]. These data collectively reinforce the impact of comorbidities and infection severity on outcomes in *S. maltophilia* infections.

Repeat culturing is associated with lower mortality not because the act of culturing itself is therapeutic, but because it often serves as a proxy for clinician vigilance and high-quality care. Clinicians who obtain repeat cultures are more likely to be closely monitoring infection progression, reassessing antibiotic effectiveness, and adjusting management promptly when needed. Additionally, patients stable enough to undergo repeat cultures may inherently have a better prognosis, introducing selection bias. Thus, the observed association likely reflects attentive clinical practice and systematic follow-up rather than a direct causal effect of repeat culturing.

Intrinsic resistance to multiple agents—including meropenem, ampicillin, cefuroxime, ceftriaxone, aztreonam, and cefoxitin—is mediated by chromosomal inducible β-lactamases [15]. High mortality among patients infected with resistant strains is mainly attributable to this mechanism [12]. Moreover, increasing resistance to tigecycline has been reported [12]. Although ceftazidime and minocycline may show in vitro susceptibility, they are not considered first-line options [16–19]. In this study, the resistance rates were 7.2% for TMP-SMX, 10.4% for levofloxacin, and 27% for ceftazidime. However, no significant association was observed between the use of these antibiotics and mortality. Similar findings reported in the literature suggest that the impact of resistance on clinical outcomes may depend not only on antibiotic selection but also on patient-specific factors such as clinical condition, underlying comorbidities, and overall treatment strategies [20]. In a recent Turkish study, resistance was 2.1% for TMP-SMX and 5.1% for levofloxacin, which may be due to the inclusion of all patient groups rather than only ICU patients [21]. Similarly, other studies reported resistance rates of 38.5% (ceftazidime), 10.8% (levofloxacin), 6.7% (sulfamethoxazole compounds), and 2.7% (tigecycline) [2]; while high susceptibility rates have also been demonstrated for TMP-SMX (96.1%) and levofloxacin (87.1%) [12]. These findings support the continued use of TMP-SMX and levofloxacin as mainstay treatment options, though vigilance for emerging resistance is essential.

Empiric therapy in this cohort commonly included meropenem, ampicillin-sulbactam, piperacillin-tazobactam, colistin, or tigecycline—none of which provide reliable coverage against *S. maltophilia*. Adjustment of therapy according to AST significantly reduced mortality, highlighting the importance of early targeted treatment. Importantly, a longer interval between ICU admission and *S. maltophilia* culture positivity was associated with higher mortality. This finding emphasizes the need for close monitoring of patients at high risk for *S. maltophilia*, obtaining cultures promptly when clinical or laboratory parameters change, and considering empiric regimens that adequately cover this pathogen. These results echo previous reports that delays in pathogen identification or in initiating effective antimicrobials are associated with worse outcomes [22]. Although time to therapy is not always clearly quantified in ventilator-associated pneumonia, older age and high disease severity at onset (e.g., elevated SOFA scores) have repeatedly been associated with poor outcomes.

The literature remains divided regarding the superiority of TMP-SMX versus levofloxacin. While some studies favor levofloxacin for bloodstream infections in ICU patients [16,23], others recommend TMP-SMX as the first-line agent, with levofloxacin as a suitable alternative [16–19]. In centers where *S. maltophilia* is prevalent, empirical regimens may need to incorporate agents active against this pathogen.

Emerging strategies include combination antibiotic therapy, novel β-lactam/β-lactamase inhibitors, and bacteriophage therapy [12]. Combinations such as TMP-SMX with ceftazidime or levofloxacin with minocycline have been reported to enhance bacterial clearance and reduce resistance emergence [18], although other studies found no mortality benefit over monotherapy [24]. Further large-scale trials are required to clarify the role of such strategies.

Taken together, mortality in *S. maltophilia* infections remains high, particularly among older ICU patients with severe disease and comorbidities such as renal failure, COPD, and malignancy. Routine empiric therapies are often inadequate; therefore, early AST-guided treatment modification is vital for improving outcomes, particularly in patients at high risk for *S. maltophilia*. TMP-SMX and levofloxacin remain the most reliable therapeutic options, although vigilance is required as resistance trends evolve.

On a global scale, strengthening antimicrobial resistance surveillance systems, updating clinical guidelines, expanding antibiotic stewardship programs, implementing strict infection control measures in ICUs, and prioritizing research into novel therapies such as phage therapy are crucial. *S. maltophilia* remains a highly lethal, resistant pathogen, and reducing its impact will require not only timely appropriate therapy, but also coordinated international efforts and innovative treatment approaches.

Conclusions

The findings emphasize that both host-related factors (age, comorbidities, immunosuppression) and pathogen-related factors (intrinsic and acquired resistance) contribute to the persistently high mortality of *S. maltophilia* infections. Early recognition, rapid AST-guided therapy, and the judicious use of effective agents such as TMP-SMX and levofloxacin are essential for improving outcomes. Investment in resistance monitoring, stewardship initiatives, infection control measures, and research into novel and combination therapies is urgently needed on a global level to combat the rising threat of of *S. maltophilia.*

Limitations

A study limitation was that 30-day mortality reflects all-cause hospital mortality, and deaths could not be specifically attributed to *S. maltophilia* infection in critically ill ICU patients. In addition, the clinical condition of the patients at the time of admission to the ICU was not recorded.

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No conflict of interest is declared.

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