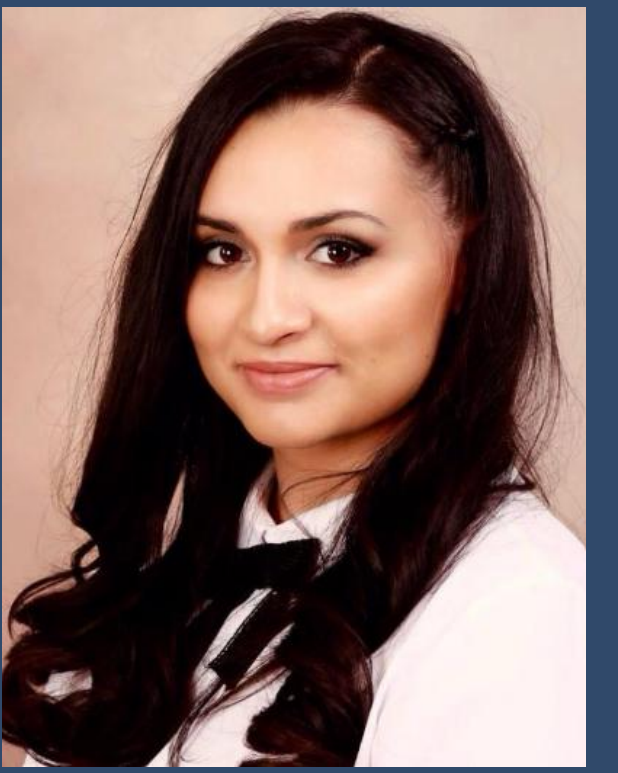




INTRODUCTION

The emergence and spread of multidrug-resistant (MDR) pathogens has been linked to excessive antibiotic use, as well as patient-related factors such as hospitalization. This study aimed to investigate how clinical characteristics influence antimicrobial resistance (AMR) and the occurrence of MDR bacteria.

METHODS

We evaluated 4492 bacterial isolates from 1719 patients and analyzed the association between resistance levels and various patient-related factors, including age, primary diagnosis, comorbidities, oral hygiene, smoking, alcohol use, and prior antibiotic therapy. AMR rate was graded from 0 to 3, and a mixed-effect continuation ratio was used for the analysis.

RESULTS I.

Across all aerobic bacteria coagulase negative staphylococci and beta-hemolytic streptococci showed the highest percentages of MDR pathogens (level 3). Among the ESKAPE pathogens, *S. aureus* and *Pseudomonas* spp. isolates exhibited the highest proportion of MDR bacteria.



Fig.1. AMR among aerobic bacteria. "Other staphylococci" primarily includes coagulase-negative staphylococci, while "other streptococci" mainly consists of viridans group streptococci.
a) Proportions of resistance levels (0-3) among aerobic bacterial isolates.
b) Distribution of species among MDR bacteria only
*No MDR bacteria (level 3) were isolated

RESULTS II.

Patients with oral cancer (OR 1.38, 95% CI 1.06–1.80), a history of smoking (OR 1.19, 95% CI 1.01–1.41), immunosuppressive therapy (OR 1.36, 95% CI 1.06–1.75), insulin-treated diabetes (OR 1.57, 95% CI 1.05–2.35), or cardiovascular disease (OR 1.28, 95% CI 1.02–1.61) had significantly higher risk of infection with MDR bacteria. Prior antibiotic use (OR 1.44, 95% CI 1.24–1.68), older age (OR 1.01, 95% CI 1.00–1.01) and female sex (OR 1.28, 95% CI 1.09–1.49) were also significantly associated with progression to multidrug resistance.

Variable	OR	95% CI	p-value
PRIMARY DIAGNOSIS			
Abscess (ref)	—	—	
Necrosis	1.11	0.84–1.48	0.46
Tumor	1.38	1.06–1.80	0.017
SEX			
male (ref)	—	—	
female	1.28	1.09–1.49	0.002
HOSPITALIZATION	1.08	0.90–1.29	0.41
RECURRENCE	1.14	0.97–1.36	0.12
FOREIGN MATERIAL	1.23	0.97–1.56	0.086
PRIOR ANTIBIOTICS	1.44	1.24–1.68	<0.001
PRIOR MALIGNANCY	1.13	0.88–1.44	0.34
RENAL FAILURE	0.92	0.51–1.67	0.79
POOR ORAL HYGIENE	1.11	0.90–1.36	0.33
DIABETES			
non-diabetic (ref)	—	—	
diabetic without insulin	1.03	0.81–1.30	0.81
diabetic with insulin	1.57	1.05–2.35	0.029
IMMUNOSUPPRESSION	1.36	1.06–1.75	0.016
SMOKING	1.19	1.01–1.41	0.038
ALCOHOL	0.89	0.68–1.17	0.42
HIGH CRP	1.16	0.84–1.61	0.36
CARDIOVASCULAR DISEASE	1.28	1.02–1.61	0.036
ANTIRESORPTIVE THERAPY	0.81	0.62–1.05	0.12
AGE	1.01	1.00–1.01	0.028

Table 1. Association of variables with the odds of progression to higher AMR categories in the CR model. Shown are odds ratios (OR), 95% confidence intervals (CI), and p-values. For categorical variables, one category was used as the reference (ref), but does not have an associated OR, CI, or p-value in the table. (Chemotherapy and radiotherapy were analyzed separately but were not significant.)

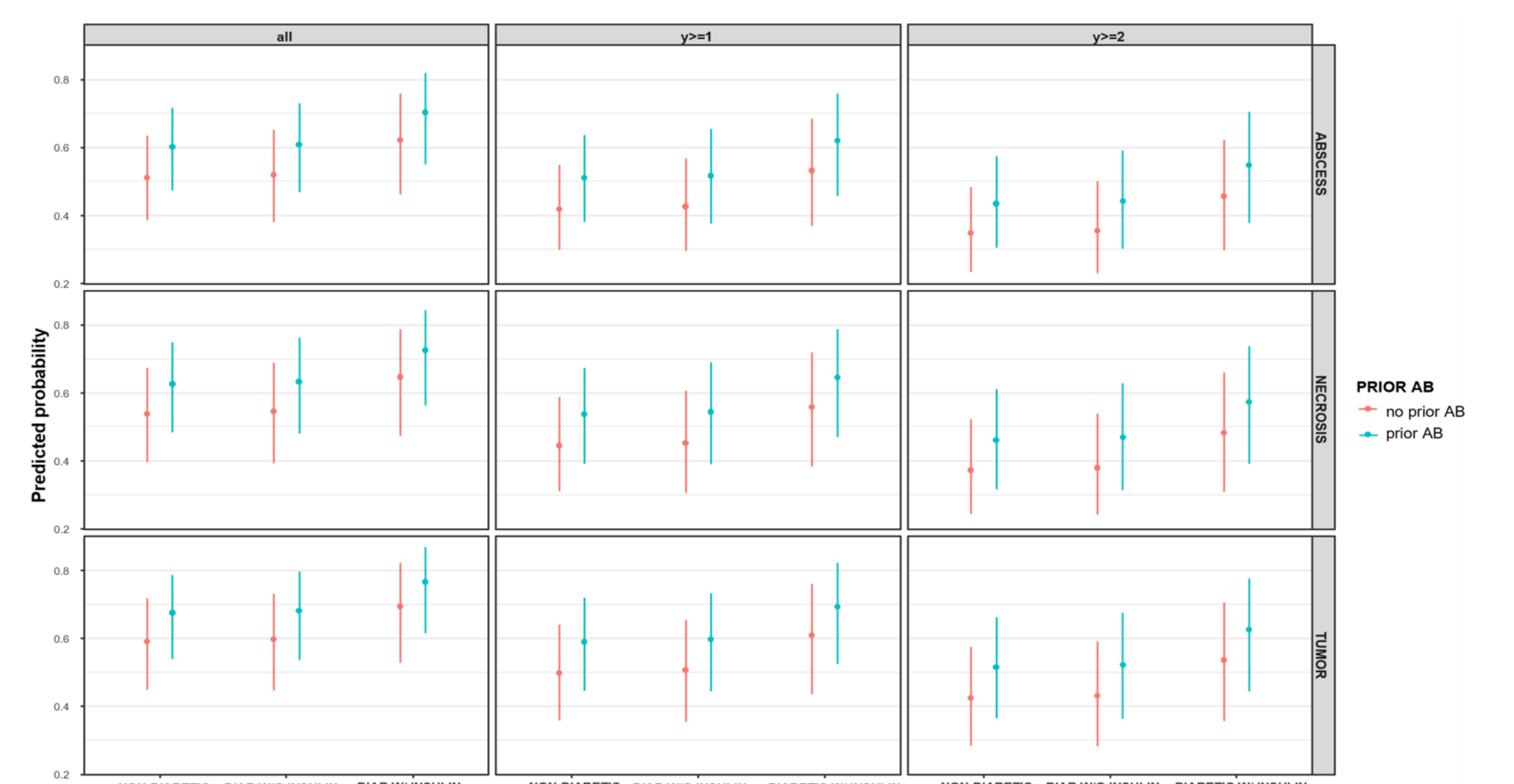


Fig. 2. Predicted probabilities of increasing AMR levels across clinical risk factors. Combined effects of primary diagnosis, diabetes status, and prior antibiotic exposure. CR models were used to estimate the predicted probability of bacterial resistance across increasing resistance thresholds: overall resistance (all), $\gamma \geq 1$, and $\gamma \geq 2$. The highest predicted probabilities were consistently seen in patients with oral cancer, insulin-requiring diabetes, and prior antibiotic use — approaching ~0.8 in the overall resistance group and remaining above 0.6 for higher resistance levels.

CONCLUSION

These findings suggest that, beyond selective pressure from antibiotics, individual patient characteristics may also contribute to the development of MDR bacteria in head and neck infections and should be carefully considered by clinicians during hospitalization, particularly regarding infection prevention and the responsible selection of antibiotics.