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Does Address Matter: A Comparison of Rural and Urban/Suburban Patients Receiving Bispecific Antibody Treatment

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INTRODUCTION

- Bispecific antibodies (bsAbs) have transformed treatment of relapsed / refractory hematologic malignancies, delivering high response rates.
- Delivery demands step-up dosing, close monitoring for CRS and ICANS, and rapid access back to the treating center.
- Access is therefore geographically constrained - and Oklahoma has a large rural population.
- Real-world outcome data comparing rural with urban / suburban recipients of bsAbs remain limited.

Does where a patient lives change outcomes after outpatient bispecific antibody therapy?

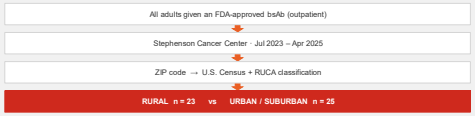
OBJECTIVE

- Describe outcomes after outpatient bsAb therapy for hematologic malignancies at a single academic center.
- Compare all-cause mortality between rural and urban / suburban residents.
- Compare CRS, ICANS, hospitalization, ICU admission and other treatment-related toxicities between groups.

PRIMARY ENDPOINT
All-cause mortality - hazard ratio for urban / suburban vs rural residence, Cox proportional hazards model.

METHODS

Design - Single-center retrospective cohort
Setting - University of Oklahoma Health Sciences Center, Stephenson Cancer Center - outpatient bsAb program, July 2023 – April 2025
Exposure - Residential ZIP code classified by U.S. Census and RUCA codes as rural vs urban / suburban
Analysis - Cox proportional hazards (HR) for mortality; relative risk with 95% CI and p-value for binary endpoints; R version 4.4.2



CONCLUSIONS

- All-cause mortality did not differ significantly by residence: HR 2.64 (95% CI 0.55–11.51) for urban / suburban vs rural.
- Kaplan–Meier curves separated numerically in favour of rural patients (log-rank p = 0.2), but the interval is very wide.
- No significant difference in CRS (RR 1.23), ICANS (1.18), hospitalization (0.85) or ICU admission (0.93).
- No significant difference in acute kidney injury (1.06), cardiovascular events (0.83), GI toxicity (0.15) or infection (1.01).
- All nine estimates have 95% CIs crossing 1.0 - clinically meaningful differences in either direction cannot be excluded.
- Within a structured outpatient bsAb program, rural residence was not associated with worse survival or higher toxicity.

RESULTS

48 outpatients · urban / suburban vs rural · July 2023 – April 2025

48 adults treated with an FDA-approved bispecific antibody, outpatient

48% of the cohort lived in a rural area (23 rural vs 25 urban / suburban)

2.64 HR for all-cause mortality, urban / suburban vs rural (0.55-11.51)

0 / 9 endpoints reached statistical significance - every CI crosses 1.0

Figure 1. All reported effect estimates - urban / suburban vs rural residence

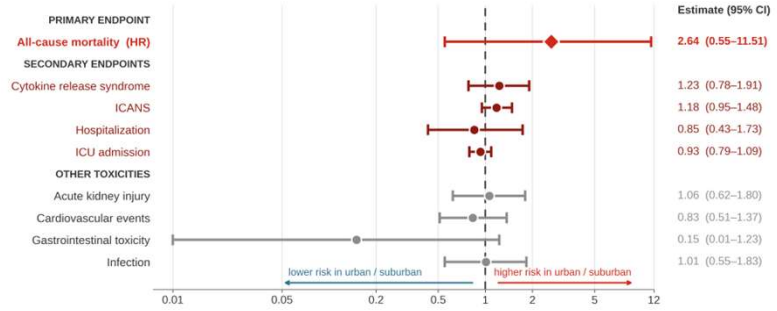
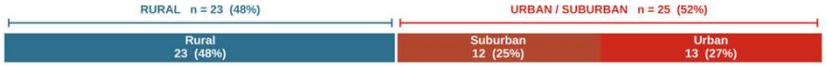


Figure 2. Cohort composition by residence (n = 48)



Urban and suburban residents were combined into a single comparison group, giving 25 urban / suburban and 23 rural patients.

Table 1. Endpoints, effect estimates and significance

Endpoint	Measure	Estimate (95% CI)	p
PRIMARY ENDPOINT			
All-cause mortality	HR	**2.64 (0.55 - 11.51)**	0.2*
SECONDARY ENDPOINTS			
Cytokine release syndrome	RR	**1.23 (0.78 - 1.91)**	0.36
ICANS	RR	**1.18 (0.95 - 1.48)**	0.11
Hospitalization	RR	**0.85 (0.43 - 1.73)**	0.69
ICU admission	RR	**0.93 (0.79 - 1.09)**	0.49
OTHER TOXICITIES			
Acute kidney injury	RR	**1.06 (0.62–1.80)**	0.83
Cardiovascular events	RR	**0.83 (0.51–1.37)**	0.50
Gastrointestinal toxicity	RR	**0.15 (0.01–1.23)**	0.05
Infection	RR	**1.01 (0.55–1.83)**	0.97

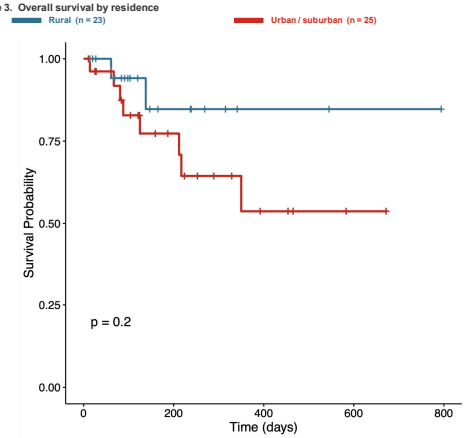
*HR = hazard ratio; RR = relative risk; reference group is rural residence. * log-rank p for the Kaplan–Meier comparison. No estimate reached significance.*

Table 2. Study at a glance

Patients analysed	**48**
Rural	**23 (48%)**
Suburban	**12 (25%)**
Urban	**13 (27%)**
Treatment window	**Jul 2023 - Apr 2025**
Setting	**Outpatient, single academic center**

KEY MESSAGE Rural residence was not associated with worse survival or higher toxicity — but 48 patients can only detect large differences.

Figure 3. Overall survival by residence



Rural patients showed higher observed survival across follow-up (≈85% vs ≈53% at the end of observation), but the difference was not statistically significant (log-rank p = 0.2; HR 2.64, 95% CI 0.55–11.51).

LIMITATIONS
Single-center cohort of 48 patients; every confidence interval is wide and the study is powered only for large effects. Retrospective design without adjustment for disease type, line of therapy, performance status or comorbidity. ZIP-code / RUCA classification does not capture travel time, transport or caregiver support and may misclassify residence. Patients able to reach an outpatient bsAb program may not represent all rural patients. Follow-up was limited to roughly two years.

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