CLINICAL OUTCOMES AND PREDICTORS OF EARLY INPATIENT CAR-T ADMINISTRATION WITHIN 48 HOURS: A NATIONWIDE ANALYSIS

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Background

CAR-T therapy has transformed treatment for relapsed or refractory hematologic malignancies. National data on early inpatient use remain limited. We evaluated whether CAR-T administration within 48 hours of admission was associated with in-hospital outcomes, resource utilization, and patient and hospital characteristics in a nationwide cohort.

Aim

To evaluate whether early inpatient CAR-T within 48 hours of admission is associated with differences in in-hospital mortality, length of stay, hospital charges, and comorbidity burden using a nationwide database.

Objectives

- Characterize outcomes of early vs. delayed inpatient CAR-T (within vs. after 48 hrs of admission).
- Compare resource utilization: LOS, hospital charges, and comorbidity index.
- Identify independent predictors of early CAR-T via multivariable logistic regression.
- Contextualize findings within specialized CAR-T inpatient care.

Methods

We conducted a weighted analysis of NIS 2016–2020 CAR-T hospitalizations. Early CAR-T was defined as administration within 48 hours of admission. Weighted χ^2 and t tests compared baseline characteristics and outcomes. Multivariable logistic regression identified independent predictors of early CAR-T, adjusting for age, sex, comorbidities, and hospital characteristics.

Results

- Among 3,021,389 weighted hospitalizations, 3,070 received CAR-T within 48 hrs and 3,018,319 after 48 hrs.
- Early CAR-T associated with lower mortality (0.8% vs 5.2%), younger age (59.0 vs 62.7 yrs), longer LOS (13.96 vs 7.59 days), higher charges ($882K vs $97K), lower CCI (4.33 vs 6.22); all P<0.001.
- **Higher aOR for early CAR-T:** CRS (7.95), Transfusion (5.63), Pancytopenia (4.81), Neutropenic fever (4.62), Acute hydrocephalus (3.47), Vasopressor use (2.75), Ventilation (2.73), AMS/Encephalopathy (2.64), CVA/TIA (2.43), Organ failure (2.11), TLS (1.51), CKD (1.38), Age (1.03).
- **Lower aOR for early CAR-T:** Inpatient death (0.046), AKI (0.36), Seizures (0.31), Hemorrhage (0.24), Cerebral edema (0.55), Sepsis (0.54).

Summary

Early inpatient CAR-T within 48 hours was associated with lower in-hospital mortality despite longer LOS, higher charges, and greater treatment toxicity. These findings suggest early CAR-T identifies a high-acuity, lower-mortality subgroup reflecting patient selection and access to specialized care.

Discussion

Very early CAR-T may reflect clinical urgency and institutional readiness for specialized hematologic care. The paradox of lower mortality alongside higher resource utilization underscores the importance of patient selection and can inform triage protocols and CAR-T center policy.

Table 1. Clinical Outcomes: Early CAR-T (≤48 hrs) vs. Delayed CAR-T (>48 hrs)

Outcome	Early CAR-T (n = 3,070)	Delayed CAR-T (n = 3,018,319)	Difference	P Value
In-Hospital Mortality	0.8%	5.2%	↓ 4.4 pp	<0.001
Length of Stay (days)	13.96	7.59	↑ 6.37	<0.001
Total Hospital Charges	$882,167	$97,094	↑ $785K	<0.001
Charlson Comorbidity Index	4.33	6.22	↓ 1.89	<0.001

Table 2. Multivariable Predictors of Early CAR-T Administration (Logistic Regression)

▲ Higher Odds of Early CAR-T

Predictor	aOR	95% CI
Cytokine Release Syndrome	**7.95**	6.02–10.50
Transfusion	**5.63**	4.02–7.89
Pancytopenia	**4.81**	4.37–5.29
Neutropenic Fever	**4.62**	4.14–5.15
Acute Hydrocephalus	**3.47**	1.39–8.66
Vasopressor Use	**2.75**	1.82–4.17
Ventilation	**2.73**	1.88–3.96
AMS / Encephalopathy	**2.64**	2.13–3.29
CVA / TIA	**2.43**	1.76–3.37
Organ Failure	**2.11**	1.83–2.42
Tumor Lysis Syndrome	**1.51**	1.24–1.84
CKD	**1.38**	1.13–1.69
Increasing Age	**1.03**	1.022–1.039

▼ Lower Odds of Early CAR-T

Predictor	aOR	95% CI
Inpatient Death	**0.046**	0.022–0.097
Hemorrhage	**0.24**	0.16–0.36
Seizures	**0.31**	0.18–0.53
AKI	**0.36**	0.30–0.43
Sepsis	**0.54**	0.43–0.67
Cerebral Edema	**0.55**	0.33–0.90

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