

Patients with traumatic brain injury (TBI) transported by Critical Care Air Transport Teams (CCATT):

The influence of altitude and oxygenation during transport

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Background

- Moderate and severe traumatic brain injuries (TBI) are life-threatening, necessitating prompt evaluation and intervention.
- The safe air transport of patients with TBI to a higher level of care requires additional considerations.
- Patients with TBI are susceptible to complications related to altitude, including hypobarism and hypoxia. To mitigate this risk, some patients are transported with a cabin altitude restriction (CAR), which limits the altitude at which an aircraft's cabin is maintained.

Objective

The goal of this study was to examine the effects of CARs on patients with TBI transported via CCATT from a Role III medical treatment facility (MTF) to Landstuhl Regional Medical Center (LRMC).

Methods

- We conducted a retrospective chart review of patients with moderate to severe TBI evacuated out of combat theater via CCATT.
- Data abstractors collected data on demographics, flight information, injury type, injury severity, pre-flight procedures, in-flight oxygenation, in-flight complications, and outcomes (mortality, hospital days, ICU days, and ventilator days).
- We calculated descriptive statistics and constructed Cox proportional hazards and logistic regression models to evaluate the association between CAR and clinical outcomes.

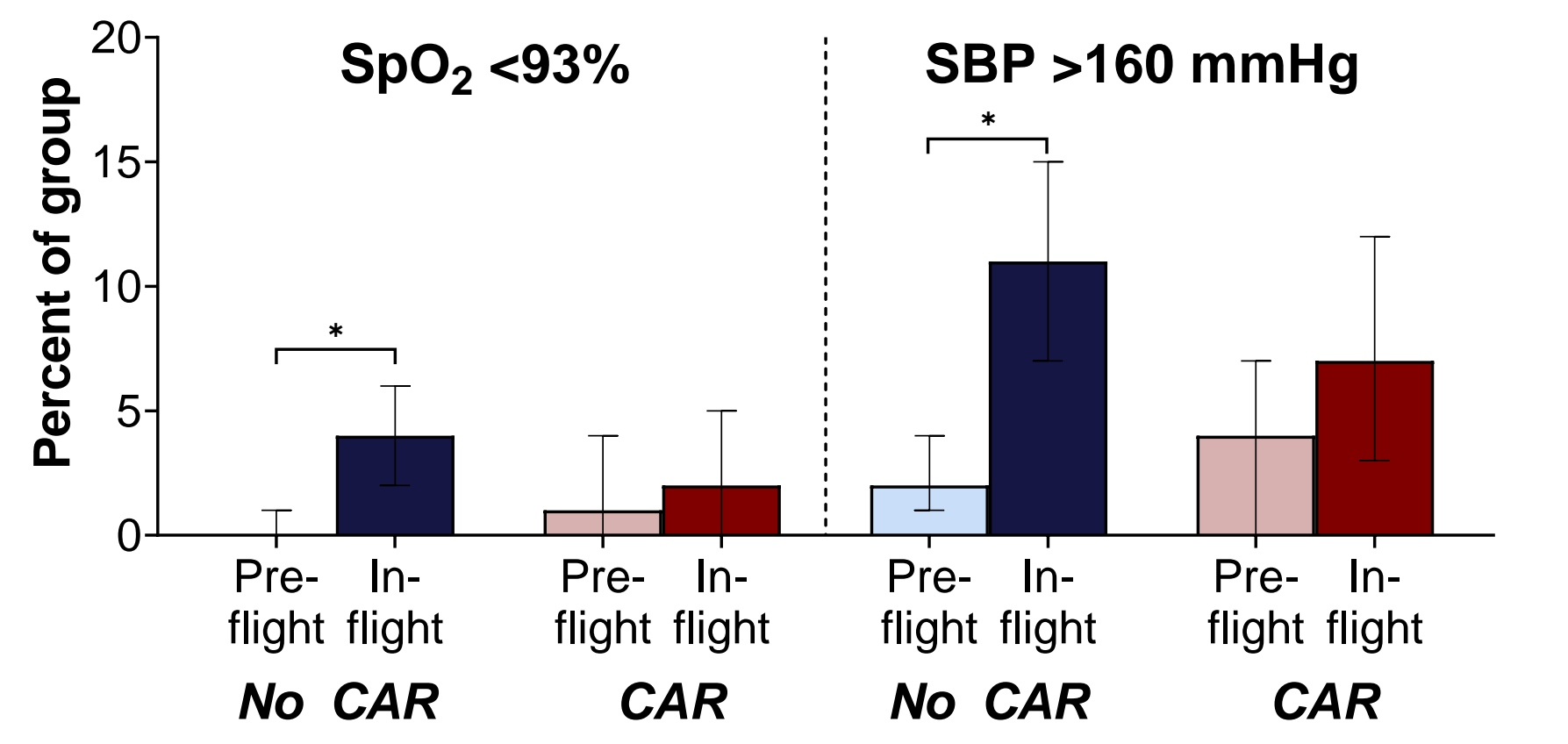


Demographics & Injury Description

- 435 patients w/ moderate-severe TBI transported via CCATT from a Role III MTF to LRMC
- 97% were male and US Active Duty; median age 25 [IQR 21-30]
- Blast (70%) and penetrating injuries (65%) were most common
- Median composite ISS was 29 [IQR 21-35]
- 60% had AIS of head/neck > 3
- 47% had an intracranial hemorrhage

Flight Information

- 31% of the sample had a recorded CAR (n=136)
- 28% had ICP monitoring; 3% had an in-flight ICP >20 mmHg
- 19% of the sample had an in-flight PaO₂ <80 mmHg
- 3% of patients experienced an in-flight SpO₂ <93%



Conclusions

- Patients with moderate or severe TBI who were evacuated without a CAR had an increased rate of hypoxia and hypertension during transport.
- However, they did not significantly differ from those who flew without a CAR with regards to mortality rates, hospital days, ICU days, or ventilator days.

Limitations

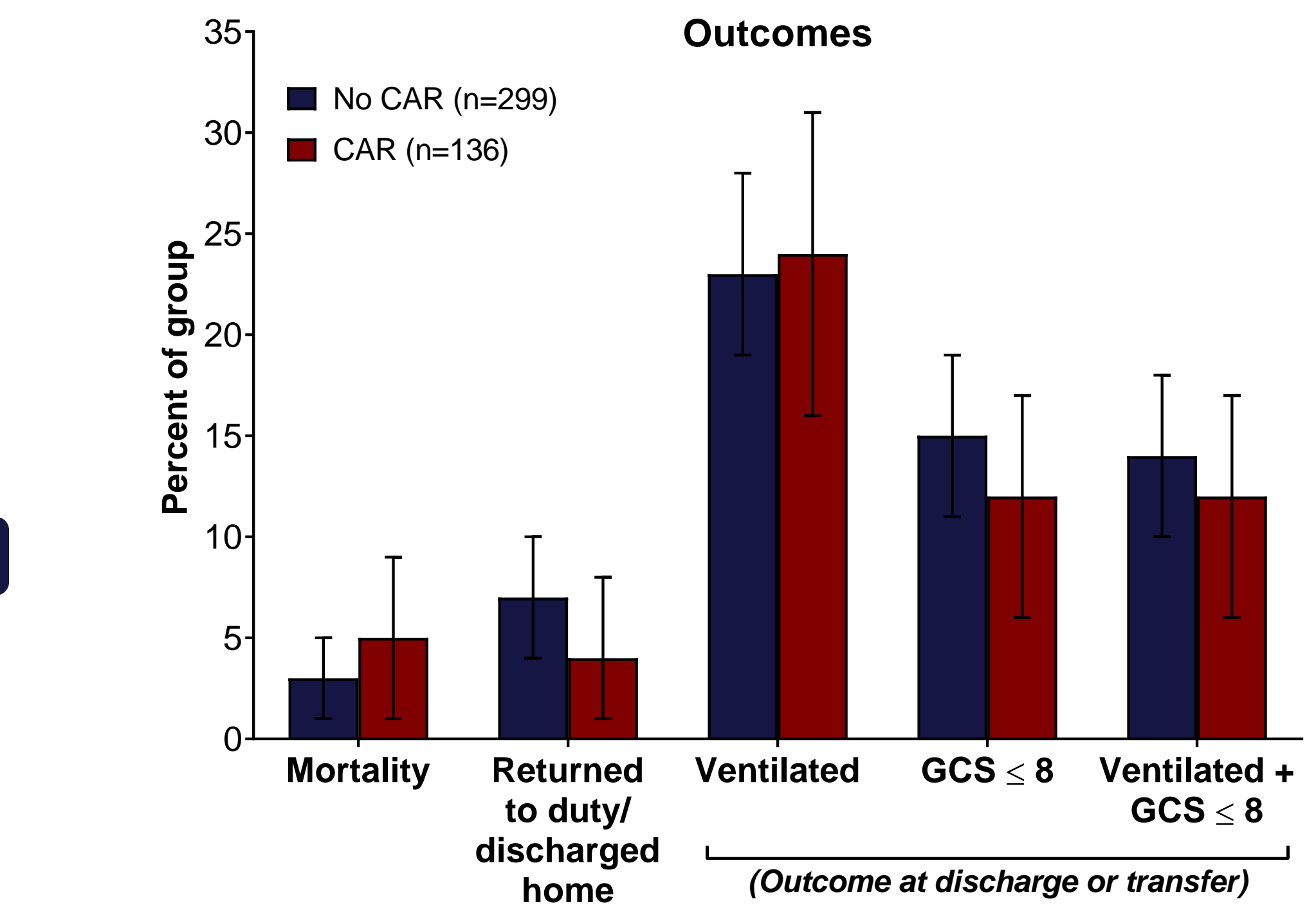
- Retrospective study; cannot infer causation
- Dependent on provider documentation and availability of data
- Highly specific sample of combat-injured patients with TBI who survived to be transported via CCATT from a Role III MTF to LRMC

Results

Outcomes

- No significant differences between groups in ventilator days, ICU days, hospital days, mortality, or discharge disposition
- No association between CAR and any of the outcomes even after clustering analyses by theater of operations and adjusting for injury severity, polytrauma, time to transport, cranial/facial fractures, presence of bone fragments/foreign bodies, pneumocephalus, ICP monitoring, and pre-flight head surgery

Outcomes	No CAR	CAR	Log-rank p-value
Median ventilator days [IQR]	6 [2-10]	5 [2-10]	0.8847
Median ICU days [IQR]	9 [6-15]	8 [5-14]	0.6247
Median hospital days [IQR]	16 [6-35]	11 [5-30]	0.2293



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