



Does Time-To-Treatment and Time-Of-Treatment Affect Aneurysmal Subarachnoid Hemorrhage Outcomes?

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Introduction

- Aneurysmal subarachnoid hemorrhage (aSAH) is a neurosurgical emergency where timely intervention is thought to affect treatment outcomes.
- Despite advances in aSAH management, morbidity & mortality remains high (1/3rd require long-term nursing care, 30% return to independent daily living).¹
- Despite concerns of rebleeding, vasospasm, and cerebral edema, there is still much debate over what is considered an “early and optimal” intervention.²⁻⁷
- While delays in treatment are presumed detrimental, the optimal window and the effect of treatment timing on outcomes remains poorly defined.
- Our objective was to evaluate the impact of both Time-To-Treatment (From CT to OR / IR) and Time-Of-Treatment (morning, afternoon, evening / overnight) on functional outcomes (mRS) in patients with aSAH.

Methods

- Single-center retrospective review (January 2013 – June 2024)
- N = 326 aSAH patients treated
- Time-To-Treatment: Categorized into: < 6 hours (N=132), 6-24 hours (N=173), > 24 hours (N=21)
- Time-Of-Treatment: Categorized into: Morning (0600-1200; N=147), Afternoon (1200-1800; N=109), Evening / Overnight (1800-0600; N=70)
- Assessed disability with the modified Rankin scale (mRS) upon discharge

Results

- Patients treated >24 hours after presentation had significantly higher odds of poor mRS (OR: 4.58, CI: 1.9-11.18, P< 0.001) (Fig. 1)
- Time-Of-Treatment was NOT statistically significant with respect to mRS at discharge (OR: 1.33, CI: 0.76-2.31, P=0.32) (Fig. 2)
- While we found no statistical significance in Time-Of-Treatment, there was a trend towards higher mRS at discharge in the evening / overnight group. (Fig. 2)

Figure 1: Modified Rankin Score by Time-to-Treatment

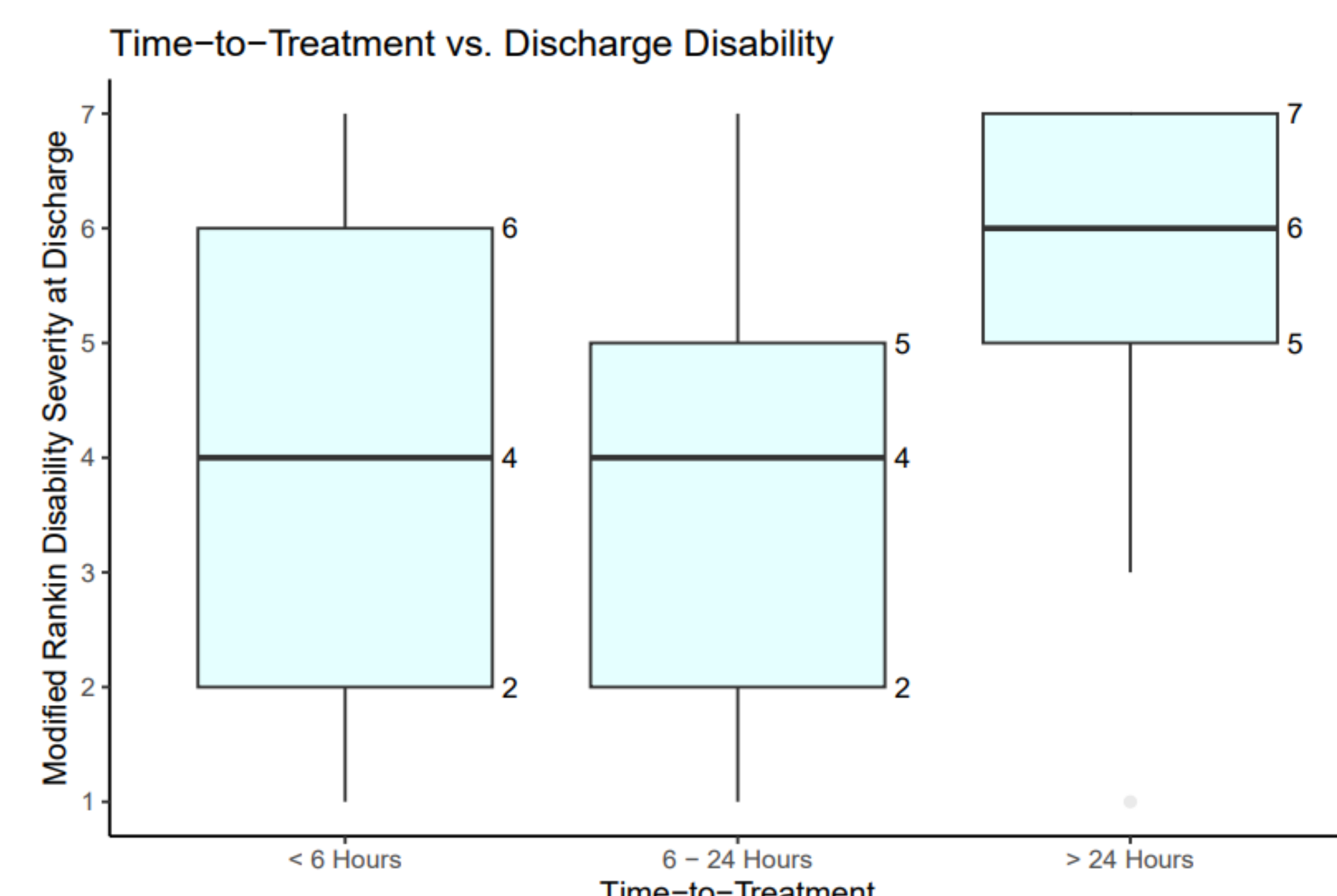
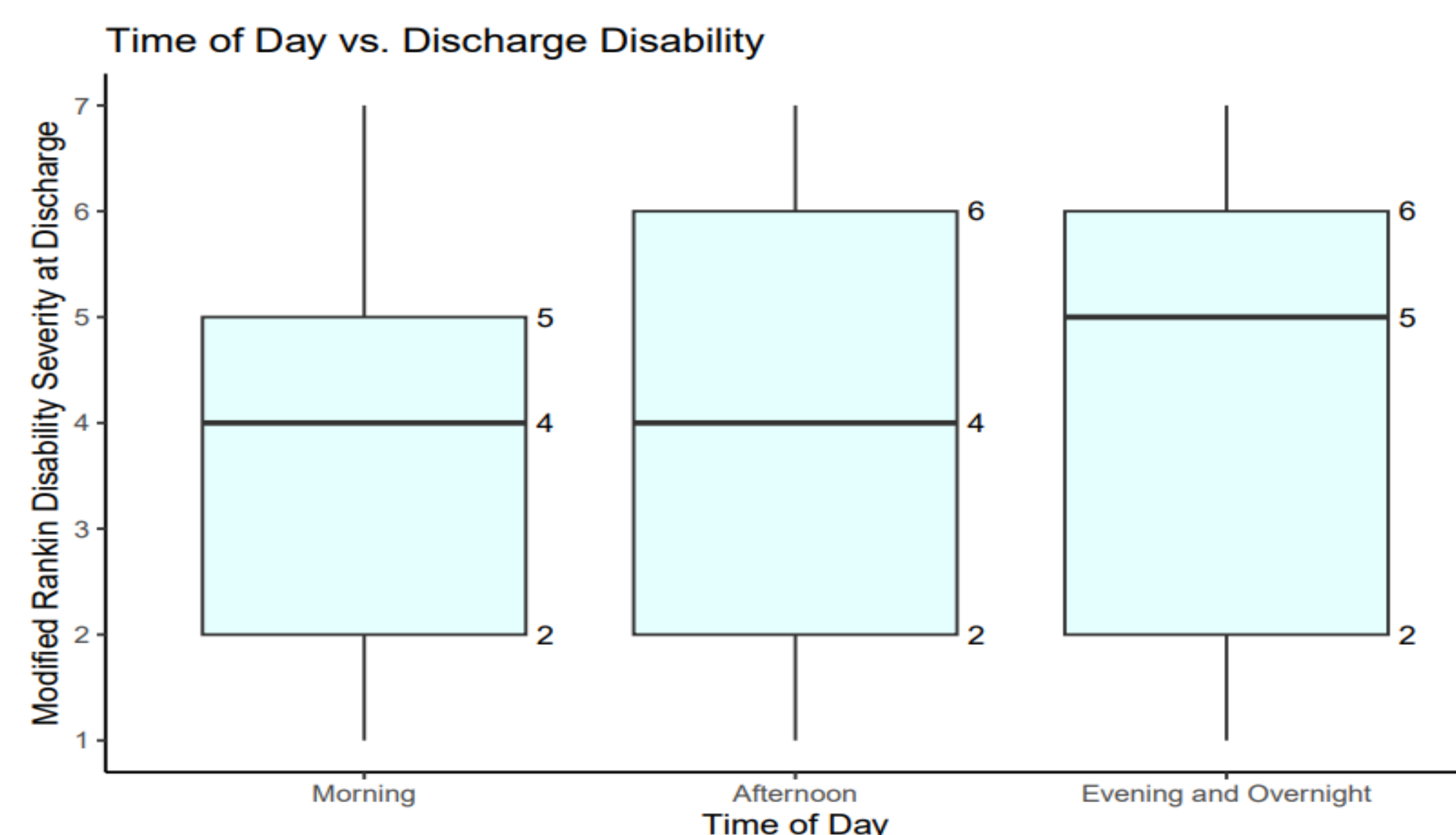


Figure 2: Modified Rankin Score by Time-of-Day of Treatment



Conclusions

- Time-To-Treatment findings raise the question as to whether patients benefit from early treatment < 6 hours versus treatment within 6 – 24 hours.
- These findings hold relevance in not only maximizing discharge outcomes, but also in addressing the economic utility and physician / staff workload regarding overnight treatment
- These findings support the prioritization of early treatment within a 24-hour window, regardless of the hour, and may inform future clinical guidelines.
- Patient context and timing remains a priori in managing aSAH patients.

Limitations/Future Studies

Limitations:

- Power (small >24 hour treatment group, N = 21 patients)
- Need for initial stabilization prior to intervention
- Transfer time from satellite facilities
- Possible delays in diagnosis (ED arrival to CTH completion)

Future Studies:

- Follow-up mRS at 3-, 6- and 12-months

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