Event Context Matters: Injury Patterns and Transport Outcomes in Collegiate EMS Standby Coverage

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ABSTRACT: Many collegiate-based emergency medical service (CBEMS) agencies operate in limited-resource standby circumstances, making anticipation of event-based clinical demand essential. Limited empirical data exist describing epidemiologic patterns and transport disposition across campus events. In this retrospective observational study, we evaluated whether injury type and ambulance transport likelihood vary by event type, and whether environmental and temporal factors predict injury rates at intramural athletic games. Among 150 standby patient encounters, settings included club/varsity athletics (n = 48), intramurals (n = 42), parties (n = 40), and other campus events (n = 20), with presentations varying by event type. Extremity injuries were most common (43.3%), followed by alcohol intoxication (22.0%) and head injury (12.7%). Transport likelihood differed significantly by event type, with the highest ambulance transfer rate at parties (70.0%) compared with other events (25.0%) and athletics (7.8%) (Fisher's exact test, $p < 0.001$). Among intramural athletic events, injury rates did not differ by precipitation or twilight conditions but varied by hour of event start time (likelihood ratio test, $p = 0.025$), with the highest rate observed during the latest games. These findings highlight opportunities for demand-specific operational planning and training. Generalizability may be limited by the single-agency, retrospective study design.

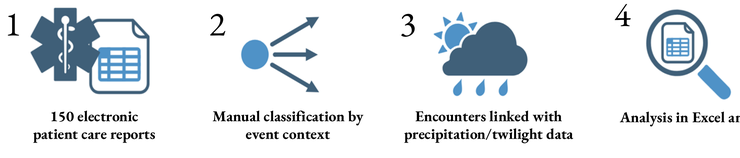
Background

- Many CBEMS agencies provide standby coverage at planned campus events, making anticipation of clinical demand essential for operational planning.[1]
- Prior studies have examined demographic and clinical factors associated with ambulance support requests by CBEMS.[2,3] Research on large collegiate sporting events and mass gatherings have demonstrated that predictable characteristics—such as event size, alcohol presence, and temperature—are associated with EMS utilization rates.[4,5]
- Limited empirical data describe how event type and timing influence patient presentations and transport outcomes at smaller-scale campus events, including non-varsity athletics and social gatherings.

Aims

1. Characterize patient presentations across CBEMS standby event types.
2. Assess differences in ambulance transport likelihood by event setting.
3. Evaluate whether injury volume at intramural athletic events varies by time or environmental conditions.

Methods



- We retrospectively analyzed electronic patient care reports from 150 standby CBEMS encounters (February 2020–November 2025). Encounters were manually classified by event context, and linked to daily precipitation and civil twilight data.
- Analyses were performed in Excel and R, and statistical significance was determined with $\alpha = .05$.
- Data were de-identified prior to analysis, and the study design was deemed IRB-exempt by the Harvard University IRB.

Results

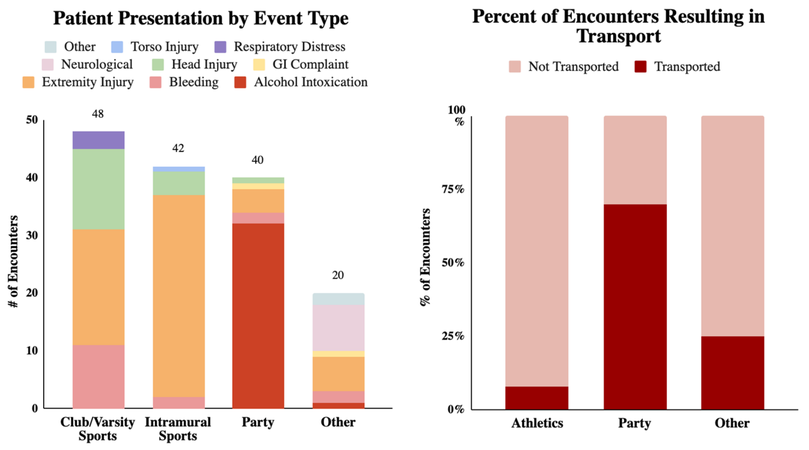


Figure 1a-b: Distinct patterns in patient presentation and ambulance transport likelihood across between event types. Transport likelihood varied by event type (Fisher's exact test, $p < 0.001$). "Other" events included reunions and student activities.

Outdoor Games on Days With and Without Precipitation

	Injuries	Games	Injuries/Game	Rate Ratio	95% CI	p-value
Precipitation	6	264	0.023	1.00	—	—
No Precipitation	22	483	0.046	2.00	(0.81, 4.94)	0.13

Outdoor Games Beginning Pre-and-Post Twilight

	Injuries	Games	Injuries/Game	Rate Ratio	95% CI	p-value
Post-Twilight	26	655	0.040	1.00	—	—
Pre-Twilight	2	92	0.022	0.55	(0.13, 2.31)	0.55

Intramural Games by Hour of Evening

	Injuries	Games	Injuries/Game	Rate Ratio	95% CI	p-value
6:00 PM	1	178	0.006	1.00	—	—
7:00 PM	8	625	0.013	2.23	(0.29, 18.22)	0.44
8:00 PM	16	703	0.023	4.05	(0.54, 30.55)	0.18
9:00 PM	6	550	0.011	1.94	(0.23, 16.13)	0.54
10:00 PM	11	276	0.040	7.09	(0.916, 54.95)	0.06

Figure 2: Comparison of injury rates at intramural athletic events segmented by environmental conditions. Rate ratios and p-values computed via Poisson test. Twilight was defined as game start time pre-or-post civil twilight.

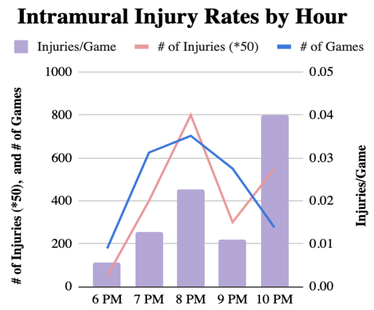


Figure 3: Injury rates at intramural athletic events by hour of evening. Injury rates varied by hour of game (likelihood ratio test, $p = 0.025$).

Discussion/Conclusion

Variation in clinical presentation and transport likelihood across campus event types suggests opportunities for event-specific operational planning in CBEMS agencies. Findings are limited by the single-agency, retrospective design but support further prospective, multi-institutional studies to clarify how event context and timing influence acuity and CBEMS utilization.

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