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A Statewide Evaluation of Validated EMS Patient Safety Clinical Trigger Tool Criteria in the Commonwealth of Virginia

AUTHORS

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INTRODUCTION

The potential for adverse events during prehospital emergency care represents an area of significant concern.[1]

While much focus has been placed on identifying encounters with potential safety concerns in the in-hospital setting, limited studies have focused on the prehospital setting.

Trigger tools represent a novel approach to providing a comprehensive and robust evaluation system to identify encounters with greater likelihood of an adverse event.

In 2018 Howard et al. developed an EMS-specific trigger tool via literature search and tested the approach in two EMS agencies; however, this important patient safety tool has yet to be evaluated in a large, real-world state-level EMS database.

OBJECTIVE

To quantify the frequency with which 9-1-1 encounters met select EMS patient safety clinical trigger criteria within the Commonwealth of Virginia during 2022.

METHODS

STUDY DESIGN

This was a retrospective observational study.

POPULATION & DATA SOURCE

All EMS events occurring between January 1, 2022 and December 31, 2022 and submitted to the Virginia Pre-Hospital Information Bridge, provided by ESO (Austin, TX), were evaluated.

Inclusion criteria were:

1) 9-1-1 response,
2) successful passage of state data validation (in the NEMSIS 3.4 standard), and
3) a disposition consistent with patient treatment and transport.

MEASURES

EMS patient safety clinical trigger criteria evaluated:

- SpO2 < 94% without supplemental oxygen provided or < 85% without assisted ventilation administered,
- Change in systolic blood pressure (SBP) > 20% from first measurement,
- Pain score > 4/10 without subsequent reduction,
- Temperature > 38° C without subsequent reduction, and
- Administration of an opioid analgesic and naloxone in the same patient.

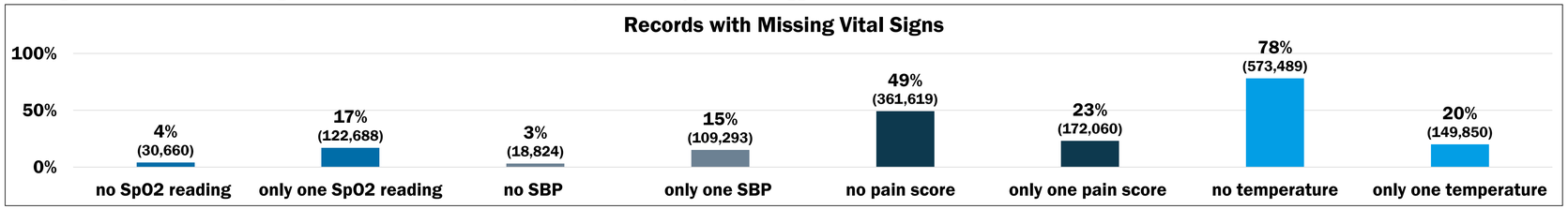
ANALYSIS

Patient safety clinical trigger frequency was compared based on the level of care of the responding EMS unit (ALS or BLS). The most frequently documented patient safety clinical triggers were also compared among events in urban and rural areas based on the Centers for Medicare and Medicaid classifications. Descriptive statistics, univariate odds ratios (OR), and 95% confidence intervals (95% CI) were calculated.

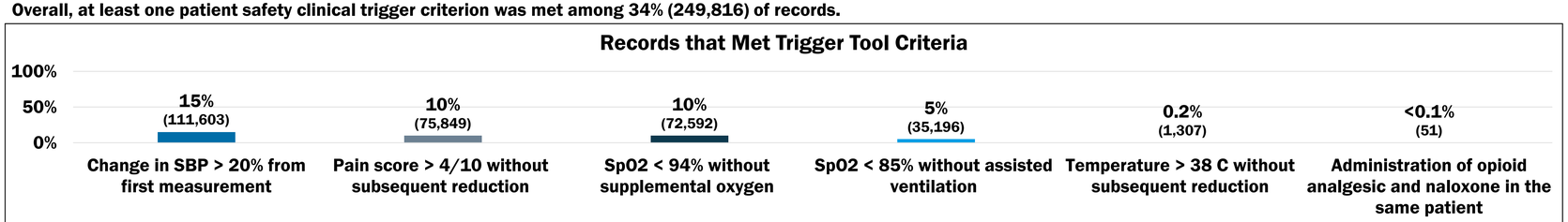
RESULTS

A total of 735,053 encounters met inclusion criteria. Of those, 18% (129,218) occurred in rural areas and 82% (605,565) in urban areas. Overall, ALS units responded to 81% (594,461) of included encounters.

Missing documentation of vital signs or a lack of documentation of repeated vitals precluded trigger criteria evaluation.

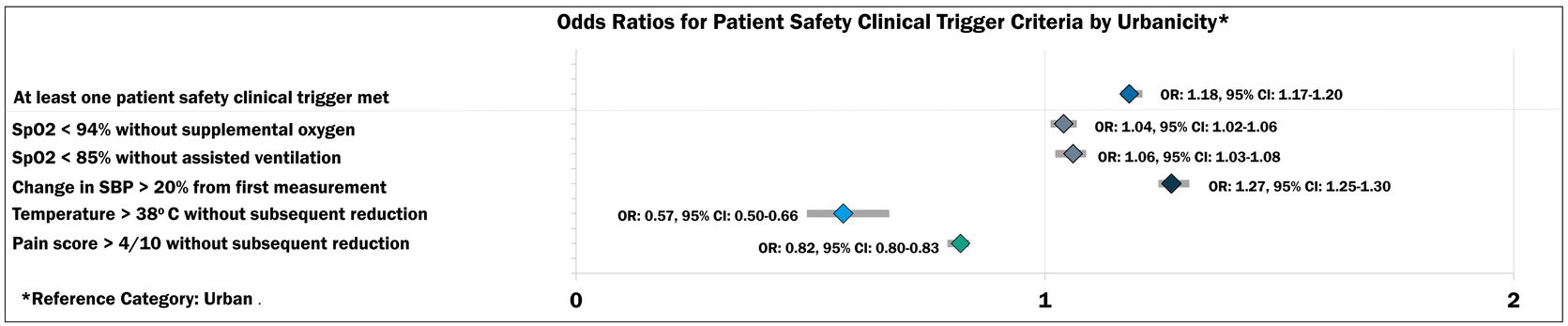


Overall, at least one patient safety clinical trigger criterion was met among 34% (249,816) of records.



Categories are not mutually exclusive.

The order of the most common triggers did not differ by level of care (i.e., ALS vs. BLS) of the responding unit.



CONCLUSION

More than one-third of 9-1-1 responses resulting in patient transport in Virginia during 2022 met at least one trigger tool criterion. Important opportunities exist to further evaluate EMS patient care records for adverse events and to design initiatives that reduce the risk of adverse events in the prehospital environment. These initiatives should take into consideration the urban-rural differences that were observed in this large statewide cohort, as encounters in rural settings were more likely to meet several patient safety clinical trigger criteria. Documentation practices should be evaluated to ensure that vital signs are appropriately recorded for relevant call types and patient presentations. Future studies should seek to evaluate emergency department and hospital outcomes for records that meet prehospital trigger tool criteria.

Reference

1. Howard I, Pillay B, Castle N, Al Shaikh L, Owen R, Williams D. Application of the emergency medical services trigger tool to measure adverse events in prehospital emergency care: a time series analysis. BMC Emerg Med. 2018 Nov 26;18(1):47. doi: 10.1186/s12873-018-0195-0. PMID: 30477423; PMCID: PMC6258398.