Predicting Early Versus Late In-Hospital Mortality in the Trauma Population

Jackson Dunitz, MD; Heather Rhodes, PhD; Antonio Pepe, MD

Grand Strand Medical Center

Background

Unintentional injury is the Fourth most common death in the US with over 200,000 people dying each year in the US [1]. Advances continue to be made in trauma surgery and critical care but it is vital to know the association and timing of morbidity and mortality to reduce the impact of trauma. Trauma mortality is a well researched and categorized field of study with the old idea of a trimodal morbidity coming into question with advances in care turning the prior trimodal peaks into a descending distribution following the first two peaks of mortality [2-3].

Objective

This study aimed to evaluate non-survivors who were admitted to a level I trauma center but then later died, in terms of prediction in who would expire early versus late.

Methods

This research was determined to be exempt/excluded from Institutional Review Board (IRB) oversight in accordance with current regulations. The data was summarized and analyzed using a multivariate linear regression in SPSS-28 to predict time to death among independent variables. For all models, *P* values less than .05 were considered statistically significant. Injuries, causes, and procedures were coded using ICD10; additional diagnostic and injury severity scoring used the AIS system.

Study Period

July 3, 2016 to February 24, 2022

Inclusion Criteria

Age (≥18 Years) with an experienced in-hospital mortality

Analysis

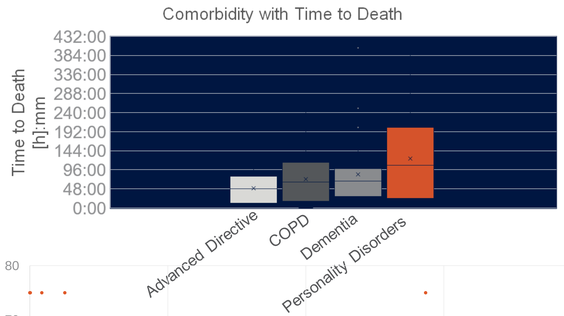
Descriptive Statistics with a Multicollinearity Test and Linear Regression

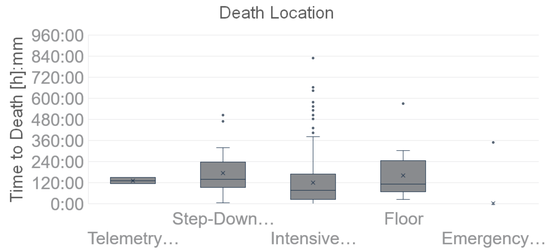
Results

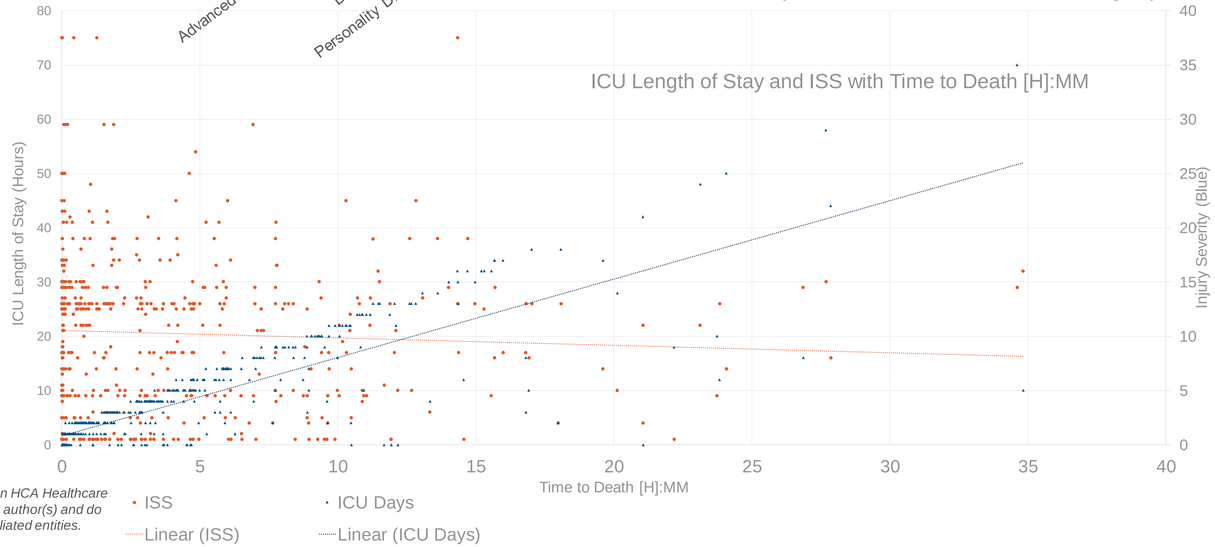
Abridged (Sig only) Linear regression analysis all adult ICU patients (≥18 years) who experienced an in-hospital mortality, July 3, 2016 to February 24, 2022 (N=546)

Outcome/Dependent Variable: Elapsed Time to Death

	B	Std. Error	Std. Coefficients Beta	t	Sig.
Injury Severity Score	-.004	.001	-.17	-2.53	.01
MTP Activated	-.18	.05	-.21	-3.18	<.01
ICU Length of Stay (Days)	.04	.00	.65	9.49	<.01
Death Location					
Emergency Department	-.28	.06	-.36	-4.71	<.01
Pre-Existing Comorbidity					
Advanced Directive	-.22	.06	-.24	-3.71	<.01
COPD	-.13	.06	-.13	-1.94	.05
Dementia	.18	.08	.15	2.35	.02
Personality Disorders	-.20	.09	-.13	-2.22	.03







Discussion

In our single center retrospective study patients that expired after admission following a level 1 activation early death were associated with COPD, personality disorders PDs and late death was associated with dementia point to actionable areas of trauma care improvement among the other associated risk factors including MTP activation, high ISS score and prolonged ICU stay. The early death associated with COPD and personality disorders and dementias association, which lead to actionable interventions for trauma teams. COPD's association with early death is instructive in terms of the risk smoking plays in overall health but also in ventilation and airway interventions for trauma patients [4]. Knowing the proper ventilation settings is crucial for achieving optimal results so interdisciplinary and inter-specialty involvement in trauma patient resuscitation may be crucial to reduce the risk posed with COPD [5]. In addition to anesthesiologist help managing difficult airways and optimal vent settings during resuscitation, mental health conditions pose a unique challenge to the trauma environment with the need of mental health interventions both acutely during resuscitation and while recovering in the ICU. Trauma and unintentional injury continue to be leading sources of death in the United States and around the world.

Conclusion

Instituting interventions to help patients with co-morbid conditions survive trauma better is an important goal that will take a multi-disciplinary approach.

References

1. Centers for Disease Control. Accidents or unintentional injuries. Retrieved Sept 20, 2022 https://www.cdc.gov/nchs/fastats/accidental-injury.htm
2. R Rauf, F von Matthey, M Croenlein, et al. Changes in the temporal distribution of in-hospital mortality in severely injured patients – an analysis of the TraumaRegister DGU. PLoS One. 2019;14(2):e0212095. doi: 10.1371/journal.pone.0212095
3. M Khan, A Azim, F Jehan, et al. Trimodal distribution of trauma deaths is no more. Journal of the American College of Surgeons. 2017 225(4):S64-S65. doi: 10.1016/j.jamcollsurg.2017.07.132
4. D Sin, N Anthonisen, J Soriano, et al. Mortality in COPD: Role of comorbidities.Eur Respir J. 2006; 28(6):1245-57. doi: 10.1183/09031936.00133805
5. S Ahmed, M Athar. Mechanical ventilation in patients with chronic obstructive pulmonary disease and bronchial asthma. Indian J Anaesth. 2015;59(9):589-598. doi: 10.4103/0019-5049.165856

This research was supported (in whole or in part) by HCA Healthcare and/or an HCA Healthcare affiliated entity. The views expressed in this publication represent those of the author(s) and do not necessarily represent the official views of HCA Healthcare or any of its affiliated entities.

HCA Healthcare®