ACC.18

1357
JACC March 20, 2018
Volume 71, Issue 11

Interventional Cardiology

FRAILTY AND CARDIOVASCULAR SURGERY, DEEP NEURAL NETWORK VERSUS SUPPORT VECTOR MACHINE TO PREDICT DEATH

Poster Contributions
Poster Hall, Hall A/B
Sunday, March 11, 2018, 3:45 p.m.-4:30 p.m.

Session Title: Complex Patients and Comorbidities: Hemodynamic Support and Frailty Assessment
Abstract Category: 19. Interventional Cardiology: Complex Patients/Comorbidities
Presentation Number: 1248-300

Authors: *Rashmee Shah, Yijun Shao, Kristina Doing-Harris, Charlene Weir, Yan Cheng, Bruce Bray, Qing Zeng, George Washington University, Washington, DC, USA, University of Utah School of Medicine, Salt Lake City, UT, USA*

Background: Death after major cardiovascular procedures (MCVP) is common among older patients, yet current prediction models do not account for frailty. We compared two machine learning models (deep neural network [DNN] and support vector machine [SVM]), incorporating frailty, to predict death after MCVP.

Methods: We identified 21,355 patients in the Veteran's Administration who underwent their first MCVP in 2014. Model features were identified from the two years prior to surgery. Frailty was extracted and categorized from text using natural language processing. Other features were diagnoses codes, medications, hospitalizations, and demographics. We represented the temporal data as a rectangular image and built a DNN model taking two input types (temporal images and non-temporal data [e.g. gender]) simultaneously to predict death within one year. SVM used similar features, but did not include temporal features from the image.

Results: Among 21,355 patients, 6.8% died within one year after MCVS. We partitioned the cohort into 3 sets (70% training, 10% validation, 20% test). The area under the curve (AUC) for mortality prediction was 78.3% (95% CI 77.1% to 79.5%) on the test data for the DNN model, compared to 74.9% (95% CI 73.6% to 76.2%) for the SVM model.

Conclusion: Frailty and time-varying comorbidities are important features in clinical decision making. DNNs that include frailty and temporal features can predict mortality after MCVS, with higher accuracy than SVM.

Example temporal representations generated from EHR data and used as input for the deep neural network