Clinical Decision Support Tools

Venous Thromboembolism CDST

Rates of venous thromboembolism (VTE) in Combat Trauma can be as high as 20 percent (*Caruso, Elster, and Rodriguez 2014, Johnston et al. 2017*). Building on a legacy dataset of 73 combat injured casualties enrolled at the Walter Reed National Military Medical Center (WRNMMC; Bethesda, Maryland) between 2007 and 2013 under a protocol entitled "The Use of the Vacuum Assisted Wound Closure Device in Treatment Extremity Wounds", the Surgical Critical Care Initiative (SC2i) at Uniformed Services University of the Health Sciences (USUHS; Bethesda, Maryland) and collaborators at WRNMMC, Naval Medical Research Center (Silver Spring, Maryland), Emory University (Atlanta, Georgia), Grady Memorial Hospital (Atlanta, Georgia), Duke University (Durham, North Carolina), Henry M. Jackson Foundation for the Advancement of Military Medicine (Bethesda, Maryland), and Decision Q Corporation (Arlington, Virginia), developed a clinical tool that can predict those at highest risk for developing VTE (Figure 1).

Exploratory analysis of the dataset focused on patient and injury characteristics, detailed wound burden measurements, and panels of biomarkers including cytokines and growth factors, specifically basic fibroblast growth factor, interleukin 1B, vascular endothelial growth factor, monokine induced by gamma interferon. Advanced machine learning techniques (Bayesian Belief Networks) were utilized to interrogate the datasets, identify drivers of interest, and build classification models. The ensuing predictive model yielded a robust area under the curve (AUC) (0.88), sensitivity (0.6), specificity (0.94), and accuracy (0.9).

Moving forward, the model will be tested within the SC2i's Tissue Data and Acquisition Protocol before moving on to an Investigational Device Exemption validation trial.

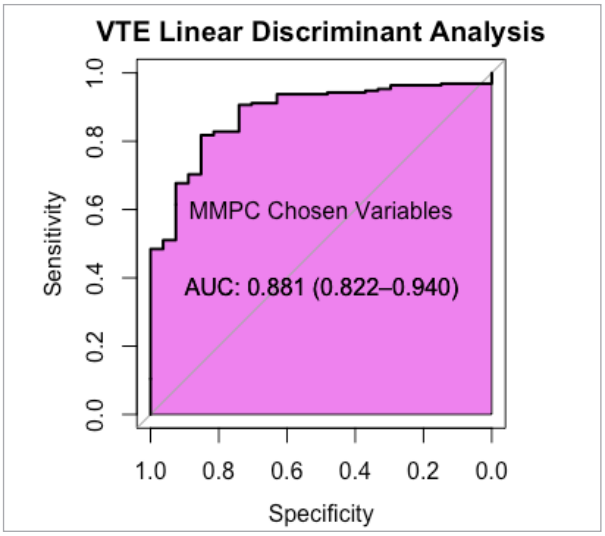

FIGURE 1: VTE Linear Discriminant Analysis. (Figure used with permission from the authors)

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REFERENCES:

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