**Title: Early critical care** **transthoracic echocardiography improves the mortality of patients undergoing mechanical ventilation: Observational data from two databases**

**Online Supplement**

Xueshu Yu1, Hao Jiang1, Wenjing Chen1, Lingling Pan1, Zhendong Fang1, Xianwei Zhang1, Zhiqing Chen1, Jie Shu1, Yincai Ye2, Jingye Pan1, \*

**Brief introduction to IPTW and CBPS.**

To balance the TTE and non-TTE cohorts, we conducted a series of sensitivity analyses, including IPTW and CBPS.

IPTW method: Inverse probability of treatment weighting (IPTW) is a popular method of using the propensity score (PS). Weight is calculated for each subject that is equal to the inverse of the probability of receiving the treatment that was actually received. The TTE group was weighted by 1/PS, and the non-TTE group was weighted by 1/(1-PS)[1]. These weights are then incorporated into the analyses to minimize the effects of observed confounding[2].

CBPS method: “The CBPS exploits the dual characteristics of the propensity score as a covariate balancing score and the conditional probability of treatment assignment. The estimation of the CBPS is done within the generalized method-of-moments or empirical likelihood framework”[3,4]. The propensity score for an individual was determined based on the given covariates of age, Sex, weight, race, HR, COPD, asthma, ARDS, sepsis, SOFA, OASIS, WBC, Hb, pH, pO2, pCO2 and lactate with a standard software package (CBPS package) for CBPS methodology.

**References：**

1. Funk MJ, Westreich D, Wiesen C, Stürmer T, Brookhart MA, Davidian M, (2011) Doubly robust estimation of causal effects. American journal of epidemiology 173: 761-767

2. Austin PC, (2016) Variance estimation when using inverse probability of treatment weighting (IPTW) with survival analysis. Statistics in medicine 35: 5642-5655

3. Rubin DB, Thomas N, (1996) Matching using estimated propensity scores: relating theory to practice. Biometrics 52: 249-264

4. Imai K, Ratkovic M, (2014). Covariate balancing propensity score. J R Stat Soc B 76:243–263.