Scoring system to predict good functional capacity in patients with multivessel coronary artery disease after coronary artery bypass grafting surgery who had undergone cardiac rehabilitation

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Abstract: P496

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Background. Pre-operative surgical risk assessment is crucial for weighing the risk and benefit of cardiac surgery. The European System for Cardiac Operative Risk Evaluation (EuroSCORE) II and the Society of Thoracic Surgeons (STS) score risk prediction model is widely employed to evaluate the risk of perioperative mortality and morbidity in patients undergoing cardiac surgery. But, these scoring system do not include prediction of the functional capacity after cardiac surgery, especially coronary artery bypass grafting (CABG) surgery. Functional capacity after CABG surgery is very essential because high functional capacity is strongly related to good outcome in quality of life, morbidity, and mortality after years later. So, prediction of good functional capacity after CABG surgery is very useful for weighing prognosis after CABG surgery.

Purpose. To construct scoring system to predict good functional capacity after CABG surgery based on pre-operative patient’s characteristic data.

Method. To construct scoring system, we make retrospective study with multivariate regression analysis from medical record data of patients with multivessel coronary artery disease (CAD) undergoing isolated CABG surgery who had undergone cardiac rehabilitation from September 2009 until June 2017 in our national cardiovascular hospital. We make prediction whether the patient can get good functional capacity (METs > 6.00) or not based on pre-operative patient’s characteristic data, such as gender, age, body mass index (BMI), left ventricular ejection fraction (LVEF), diabetes mellitus, hypertension, dyslipidaemia, smoking, family history of CAD, and rhythm of electrocardiogram (ECG).

Result. The developmental dataset had 839 patients. The multivariate regression analysis showed six variables that can significantly predict METs score > 6.00. The variable was age = 71 years old (OR 0.05, 95%CI 0.01 to 0.55, p=0.013), gender male (OR 11.25, 95%CI 6.86 to 18.44, p<0.001), BMI = 25 kg/m2 (OR 0.58, 95%CI 0.37 to 0.91, p=0.019), moderate LVEF 40-49% (OR 0.52, 95%CI 0.35 to 0.78, p=0.002), reduced LVEF < 40% (OR 0.31, 95%CI 0.17 to 0.59, p<0.001), and atrial fibrillation (OR 0.25, 95%CI 0.07 to 0.87, p=0.029). The regression formula is \( y = 0.851 - (2.925 \times \text{age} = 71 \text{ years old}) - (0.544 \times \text{BMI} = 25 \text{ kg/m}^2) + (2.42 \times \text{Male}) - (0.652 \times \text{LVEF 40-49%}) - (1.16 \times \text{LVEF < 40%}) - (1.371 \times \text{atrial fibrillation}) \). In the formula, valued 1 in the variable if age = 71 years old, BMI = 25 kg/m2, male, LVEF 40-49%, LVEF < 40%, or atrial fibrillation is present and 0 if the variable is absent. The patient’s probability got METs score > 6.00 is \( P = 1 / \{1+\exp(-y)\} \). Calibration by Hosmer Lemeshow Chi Square was (8) = 9.192 (p = 0.327) and the area under the ROC curve was 0.779 (95%CI 0.742 to 0.817, p < 0.001).

Conclusion. Scoring system to predict good functional capacity after CABG surgery had been constructed with good quality.