

Med-Score 24: A multivariable prediction model for poststernotomy mediastinitis 24 hours after admission to the intensive care unit

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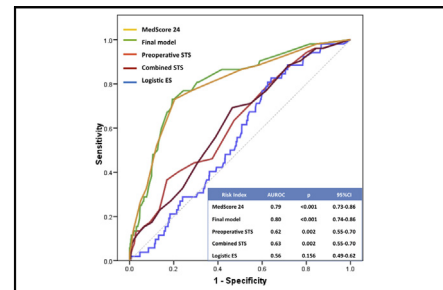
ABSTRACT

Objectives: Mediastinitis is a serious complication of heart surgery. In this study, we developed a bedside risk score for poststernotomy mediastinitis.

Methods: Data were prospectively collected from 4625 patients admitted to our intensive care unit after heart surgery (January 2005-June 2011). Mediastinitis was defined according to Centers for Disease Control and Prevention criteria. A logistic model was constructed in a randomly selected subgroup of 2618 patients and validated in a second cohort of 1352, as well as in a prospective cohort of 2615 (June 2011-December 2015). Model discriminatory power was assessed according to the area under the receiver operating characteristic curve (AUROC). The β coefficients of the model were used to define 3 levels of mediastinitis risk as a score designated Med-Score 24. Its performance to predict mediastinitis was compared with that of the logistic EuroSCORE and Society of Thoracic Surgeons score.

Results: Ninety-four (2.36%) patients developed mediastinitis. The risk factors identified as predictive of mediastinitis (AUROC 0.80) were 4 preoperative variables (age >70 years, chronic obstructive lung disease, obesity, and antiplatelet therapy) and 3 perioperative variables (prolonged ischemia, emergency reoperation, and prolonged intubation). AUROCs for the Society of Thoracic Surgeons score and logistic EuroSCORE were 0.63 and 0.55, respectively, both differing significantly from the area calculated for Med-Score 24 ($P < .001$).

Conclusions: The score developed showed excellent predictive power 24 hours after admission to the intensive care unit for mediastinitis risk. This simple tool helps stratify patients according to this risk, thus identifying high-risk patients for preventive measures. In our patient cohort, Med-Score 24 performed better than other scores used for this purpose. (J Thorac Cardiovasc Surg 2017; ■:1-11)



Predictive powers of mediastinitis risk scores for 3970 heart surgery patients.

Central Message

We present a new score to predict the risk of poststernotomy mediastinitis. This bedside score can be used within 24 hours after a patient undergoing major heart surgery is admitted to the ICU.

Perspective

Poststernotomy mediastinitis is a serious complication of heart surgery. Our objective was to develop and validate a simple bedside mediastinitis risk score for use within 24 hours of major heart surgery. The rationale was that if we could accurately and quickly predict this postoperative complication, we could implement appropriate prevention strategies and reduce its impacts.

See Editorial Commentary page XXX.

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Despite advances in heart surgery and strategies for preventing surgical-site infection (SSI), poststernotomy mediastinitis (PSM) remains a major concern. The



Scanning this QR code will take you to the supplemental tables, appendix, and video for this article.



Abbreviations and Acronyms

AUROC	= area under the receiver operating characteristic curve
CABG	= coronary artery bypass grafting
CBP	= cardiopulmonary bypass pump
CI	= confidence interval
COPD	= chronic obstructive pulmonary disease
ICU	= intensive care unit
IMA	= internal mammary artery
logES	= logistic EuroSCORE
MHS	= major heart surgery
OR	= odds ratio
PSM	= poststernotomy mediastinitis
ROC	= receiver operating characteristic
SSI	= surgical-site infection
STS	= Society of Thoracic Surgeons



VIDEO 1. Potential impacts of Med-Score 24. Video available at: <http://www.jtcvsonline.org>.

incidence of this serious complication has been estimated at 0.5 to 4%,¹⁻³ and it has been associated with prolonged hospital stay and increased mortality and cost.⁴⁻⁹

Risk scoring systems are useful for predicting postoperative complications and implementing appropriate prevention strategies. The impact of PSM on morbidity and mortality underscores the importance of accurately defining risk factors to identify high-risk patients both for pre- and perioperative prevention and for increased diagnostic awareness and early therapy. In numerous studies, several risk factors for developing PSM have been described.^{10,11} A recent review has also reported the variables needed for the European Association for Cardio-Thoracic Surgery

risk-prediction model, although this model does not include mediastinitis as an endpoint.¹² Scores predicting mediastinitis have also been developed for different regions.^{1,13-23} However, these risk scores have not always been validated or have shown suboptimal performance,^{24,25} and it is not clear how generalizable to different patient settings these scores are.²⁶

The objectives of our study were to identify independent risk factors for PSM to include in a specific predictive model for the bedside assessment of patients who undergo heart surgery 24 hours after their admission to the intensive care unit (ICU). The scoring system developed, designated Med-Score 24, was then validated in a prospective cohort and its performance compared with that of other established scores (Video 1).^{1,11}

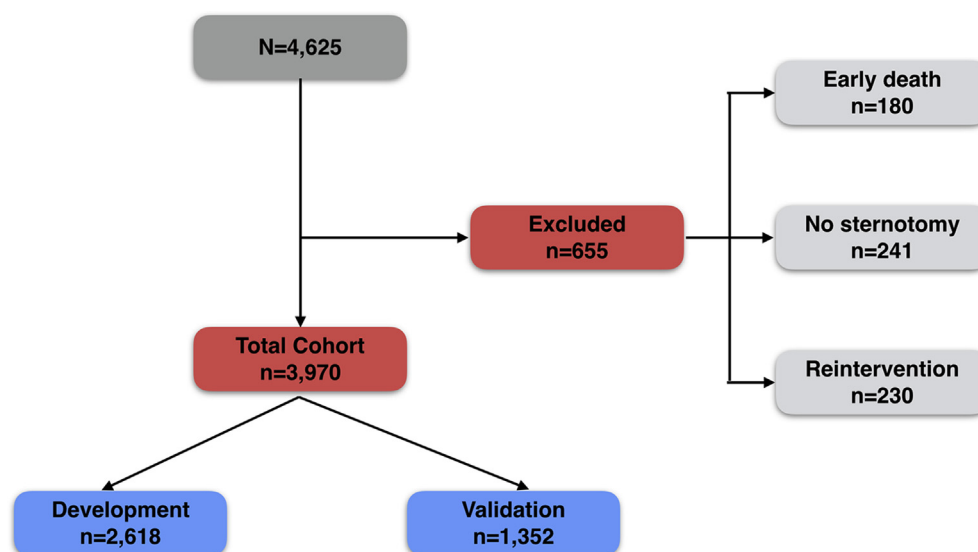


FIGURE 1. Flow diagram of participant recruitment.

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