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EDITORIAL COMMENTARY

What's in a word?: The importance of data to support a precise definition

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Understanding how risk factors are defined is of paramount importance. Risk assessment based on incorrect understanding of the definition of a risk factor may lead to inappropriate decisions and have a substantial effect on outcomes. An example is the definition of chronic lung disease (CLD), in the Society of Thoracic Surgeons (STS) database.¹ CLD is defined by the presence of airway obstruction, hypoxemia, hypercarbia, and by the use of inhaled or oral bronchodilators or steroid therapy. Severity of CLD is defined by various degrees of these impairments. Without precise spirometry and arterial blood gas data to support the correct classification, more than one third of patients receive incorrect assignments to a CLD severity category, resulting in over- or under-estimation of their surgical risk.²

The STS adult cardiac surgery database provides clinicians and patients with risk models that adjust patient outcomes for procedure and preoperative risk factors.³⁻⁵ Chronic lung disease is one of the risk factors included in the STS model for mortality, renal failure, prolonged

ventilation, sternal wound infection, reoperation, and length of hospital stay.³⁻⁵ Mild, moderate, and severe CLD increases the odds ratio for those complications. A total of 20% of the almost 1 million patients used in developing the current STS risk model had CLD.

Given that a pulmonary function test (PFT) has not been a routine part of the preoperative evaluation before cardiac surgery, most patients are assigned a CLD category using only

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Central Message

A pulmonary function test is essential to correctly risk-stratify patients before cardiac surgery.

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clinical criteria, without objective spirometric or arterial blood gas data.⁶ In this issue of the *Journal*, Ivanov and colleagues⁷ attempted to address 2 questions raised by these observations: (1) Would performing a preoperative PFT improve the classification of patients into the correct STS-CLD category; and (2) Would adding a PFT (forced expiratory volume in 1 minute; forced vital capacity; and the ratio of the volume to capacity) to the STS-CLD category improve the predictive accuracy of the STS risk model for mortality, respiratory failure, and length of hospital stay.

The answer to the first question is obvious: Preoperative spirometry and arterial blood gas data would allow for improved risk stratification and discrimination of the prediction model. The prevalence and severity of CLD cannot be determined without a PFT measurement. Besides, because a PFT is not routinely performed, the decision to perform a PFT on only certain patients demonstrates selection bias. Patients who underwent a preoperative PFT were most likely perceived by their physician as being higher-risk patients.

This finding is demonstrated clearly in the STS database, in which only one third of the isolated aortic valve replacement patients had a PFT done preoperatively.⁶ If a PFT was performed, the prevalence of CLD increases from 20% to 50%, and the prevalence of severe CLD increases³⁻⁶ from 3% to 11%. Similarly, in the study by Ivanov and colleagues,⁷ only 53% of patients had a PFT, and those patients were older, sicker, and had a higher-risk profile than the patients that did not have a PFT.

To answer the second question, the authors⁷ performed a receiver operating characteristic curve analysis. They found that none of the PFT parameters added to the predictive ability of the STS risk model for operative mortality, prolonged ventilation, or prolonged length of hospital stay. Because CLD is 1 of the 40 preoperative and operative variables included in the STS risk model, an improvement in discrimination of only 1 of 40 variables is very unlikely to improve the overall model. In addition, the STS predictive model is very accurate, with observed versus expected

event proportions within deciles of predicted risk for various endpoints.³

One may be tempted to conclude that it is not worth performing a PFT before cardiac surgery. However, before making such a radical statement, remember once again the importance of precise and accurate data to support risk stratification. The incorporation of spirometry and arterial blood gas data into the new version of the STS data collection forms will certainly increase accuracy of classification and the proportion of patients with complete data. Spirometry plays an essential role in improving the accuracy of stratification of patients into various CLD categories, guiding care, and determining the risk-adjusted outcomes of surgeons and programs. So, what's in a word? In science, behind each word resides a precise definition; without a PFT, we cannot define CLD severity.

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