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Editorial

Editorial: Risk Prediction in Smokers

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Abbreviations: Body mass index-airflow Obstruction-Dyspnea-Exercise capacity, **BODE;** Age-Dyspnea-airflow Obstruction, **ADO;** Global initiative for chronic Obstructive Lung Disease, **GOLD;** COPD Genetic Epidemiology, **COPDGene;** forced expiratory volume in 1 second, **FEV_1,** computed tomography, **CT**

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Risk Prediction

Risk is usually perceived as the possibility of something bad happening. Risk prediction is therefore about estimating the likelihood that something bad will happen – and as physicians we often think about patient risk. Risk prediction is well established in many areas of medicine, probably most well-known in the area of risk of cardiovascular disease where the Framingham Risk Score has been applied in clinical practice for more or less 20 years.[1]

COPD Genetic Epidemiology Study Risk Prediction

In COPD, several risk prediction scores for mortality have been suggested, with the Body mass index (BMI)-airflow Obstruction-Dyspnea-Exercise capacity (BODE) index[2] and in some areas the Age-Dyspnea-airflow Obstruction (ADO) index[3] being the most widely cited. Not surprisingly, most of these indices include variables such as age, level of airflow limitation, degree of breathlessness and in some instances, exercise capacity. Many of them have been developed in patients with advanced disease and almost all have exclusively worked with patients diagnosed according to criteria from the Global initiative for chronic Obstructive Lung Disease (GOLD).[4] In this issue of *Chronic Obstructive Pulmonary Diseases: Journal of the COPD Foundation*, Strand et al[5] present the results of a risk prediction analysis among smokers in the COPD Genetic Epidemiology (COPDGene®) cohort with 10-year mortality as the outcome; their findings were validated in the SPIROMICS cohort. Apart from age, forced expiratory volume in 1 second (FEV_1) and 6-minute walking distance had the most marked effect on prognosis. Other variables required for the model were age, gender, BMI, smoking status (former or current), pack years, comorbidities (cancer, diabetes or cardiovascular disease), 2 computed tomography (CT)-derived indices and modified Medical Research Council dyspnea score. Their model delivers a point-scale that can be translated into a percentage -risk.

Is this risk prediction model then ready for prime time? Will it be implemented rigorously in respiratory clinics in the United States and beyond? Probably not. It is almost as if the respiratory community has a tradition for not agreeing on issues like this. You only need to recall how little the BODE index has been applied – much more time was spent on deriving an index that was slightly better. Or the decade spent on discussing which CT indices to use for quantifying degree of and change in emphysema, only recently

laid to rest by large studies such as COPDGene. Other specialties have been much better on agreeing on indice such as the Tumor-Nodes-Metastases staging index in oncology and the Framingham Risk Score in cardiology. With these standardized indices, both specialties have been able to progress at a pace more impressive than what we have seen in respiratory medicine in general and COPD in particular.

So, what will be the main objections to the presented risk prediction score? The first will be that it only applies to smokers. This is likely a minor issue for most but relevant in many parts of the world; however, one would likely only expect a mortality risk prediction model to work in areas with fairly similar socioeconomic features. Given the impact of socioeconomic status on mortality, it is perhaps a little surprising that length of education is not a feature of the model. Secondly, it will be pointed out that the score is based on a convenience cohort and not a population sample as has been the case for the Framingham Risk Score. Subsequent application in other cohorts will show if this is a problem or not. Thirdly, it will be criticized for being too complex and too detailed in the assessment, something that is easily solved with easy-to-use digital tools. Personally, I would have liked a small second-class model without the CT indices as this would allow it to be more widely used. Finally, it will likely be met with the usual comment "nice, but with our data, we can develop an even better model…."

Does the model surprise us? Probably not. However, there are some clear differences in effect according to gender. Cachexia is riskier for men than women, and low level of lung function has a larger impact on women – demonstrating that there is a limit for absolute volumes being compatible with life.[6] The effect of remaining a smoker compared to becoming a quitter is fairly small and this could be an issue worth revisiting in the future. The limited effect is likely a reflection of smoking cessation still being associated with severe disease; cessation is driven by worsened disease. One could hope that less sick COPD patients will in the future be more likely to quit smoking, thus making the risk associated with being an ex-smoker smaller.

Finally, the authors highlight that the model provides prediction within GOLD categories, but this is hardly a surprise given that GOLD only uses FEV_1 and has given up on staging COPD. I would hope that GOLD and other authoritative bodies in the COPD world would embrace the idea of a risk prediction score – and why not use the one presented by Strand et al?

Declaration of Interest

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