Mortality prediction in chronic obstructive pulmonary disease comparing the GOLD 2007 and 2011 staging systems: A pooled analysis of individual patient data

Soriano J.B.

Lamprecht B.

Ramírez A.S.

Martinez-Camblor P.

Kaiser B.

Alfageme I.

Almagro P.

Casanova C.

Esteban C.

Soler-Cataluña J.J.

de-Torres J.P.

Miravitlles M.

Celli B.R.

Marin J.M.

Puhan M.A.

Sobradillo P.

Lange P.

Sternberg A.L.

Garcia-Aymerich J.

Turner A.M.

Han M.K.

Langhammer A.

Leivseth L.

Bakke P.

Johannessen A.

Roche N.

Sin D.D.

Background: There is no universal consensus on the best staging system for chronic obstructive pulmonary disease (COPD). Although documents (eg, the Global Initiative for Chronic Obstructive Lung Disease [GOLD] 2007) have traditionally used forced expiratory volume in 1 s (FEV_1) for staging, clinical parameters have been added to some guidelines (eg, GOLD 2011) to improve patient management. As part of the COPD Cohorts Collaborative International Assessment (3CIA) initiative, we aimed to investigate how individual patients were categorised by GOLD 2007 and 2011, and compare the prognostic accuracy of the staging documents for mortality. Methods: We searched reports published from Jan 1, 2008, to Dec 31, 2014. Using data from cohorts that agreed to participate and had a minimum amount of information needed for GOLD 2007 and 2011, we did a patient-based pooled analysis of existing data. With use of raw data, we recalculated all participant assignments to GOLD 2007 I-IV classes, and GOLD 2011 A-D stages. We used survival analysis, C statistics, and non-parametric regression to model time-to-death data and compare GOLD 2007 and GOLD 2011 staging systems to predict mortality. Findings: We collected individual data for 15 632 patients from 22 COPD cohorts from seven countries, totalling 70 184 person-years. Mean age of the patients was 63·9 years (SD 10·1); 10 751 (69%) were men. Based on FEV_1 alone (GOLD 2007), 2424 (16%) patients had mild (I), 7142 (46%) moderate (II), 4346 (28%) severe (III), and 1670 (11%) very severe (IV) disease. We compared staging with the GOLD 2007 document with that of the new GOLD 2011 system in 14 660 patients: 5548 (38%) were grade A, 2733 (19%) were grade B, 1835 (13%) were grade C, and 4544 (31%) were grade D. GOLD 2011 shifted the overall COPD severity distribution to more severe categories. There were nearly three times more COPD patients in stage D than in former stage IV ($p<0·05$). The predictive capacity for survival up to 10 years was significant for both systems ($p<0·01$) but area

under the curves were only 0·623 (GOLD 2007) and 0·634 (GOLD 2011), and GOLD 2007 and 2011 did not differ significantly. We identified the percent predicted FEV$_1$ thresholds of 85%, 55% and 35% as better to stage COPD severity for mortality, which are similar to the ones used previously. Interpretation: Neither GOLD COPD classification schemes have sufficient discriminatory power to be used clinically for risk classification at the individual level to predict total mortality for 3 years of follow-up and onwards. Increasing intensity of treatment of patients with COPD due to their GOLD 2011 reclassification is not known to improve health outcomes. Evidence-based thresholds should be searched when exploring the prognostic ability of current and new COPD multicomponent indices. Funding: None. © 2015 Elsevier Ltd.