# Renal function improves mortality prediction in acute pulmonary embolism: results of a multicentre cohort study with external validation in the RIETE registry

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**Background:** Renal dysfunction may influence outcomes after pulmonary embolism (PE). We determined the incremental value of adding renal function impairment (estimated glomerular filtration rate, eGFR $<$60 ml/min/1.73m$^2$) on top of the 2019 ESC prognostic model, for the prediction of 30-day all-cause mortality in acute PE patients from a prospective, multicenter cohort.

**Methods and results:** We identified which of three eGFR formulae predicted death most accurately. Changes in global model fit, discrimination, calibration and net reclassification index (NRI) were evaluated with addition of eGFR. We prospectively included consecutive adult patients with acute PE diagnosed as per ESC guidelines. Among 1,943 patients, (mean age 67.3±17.1, 50.4% women), 107 (5.5% (95% CI 4.5–6.5%)) died during 30-day follow-up. The eGFRMDRD4 formula was the most accurate for prediction of death. The observed mortality rate was higher for intermediate-low risk (OR 1.8, 95% CI 1.1–3.4) and high-risk PE (OR 10.3, 95% CI 3.6–17.3), and 30-day bleeding was significantly higher (OR 2.1, 95% CI 1.3–3.5) in patients with vs without eGFRMDRD4 $<$60 ml/min/1.73m$^2$. The addition of eGFRMDRD4 information improved model fit, discriminatory capacity, and calibration of the ESC models. NRI was significantly improved ($p<0.001$), with 18% reclassification of predicted mortality, specifically in intermediate and high-risk PE. External validation using data from the RIETE registry confirmed our findings (Table).

**Conclusion:** Addition of eGFRMDRD4-derived renal dysfunction on top of the ESC prognostic algorithm yields significant reclassification of risk of death in intermediate and high-risk PE. Impact on therapy remains to be determined.

| | Study population | | External validation | |
|---|---|---|---|---|
| With eGFRMDRD4 | No | Yes | No | Yes |
| Bayes information criterion | 812.3 | 804.4 | 3458.3 | 3386.5 |
| Akaike information criterion | 801.2 | 787.6 | 3443.2 | 3363.2 |
| Discrimination/Calibration | | | | |
| Harrell's C index | 0.631 | 0.676# | 0.617 | 0.667# |
| P Hosmer-Lemeshow | 0.009 | 0.06 | $<$0.001 | 0.12 |
| Risk reclassification | | | | |
| User category NRI (% (95% CI)) | – | 19.5 (6.3–32.6)# | – | 21.1 (16.0–26.1)# |
| % of 30-day mortality correctly reclassified | – | 18% | – | 44% |

#$p<0.05$.