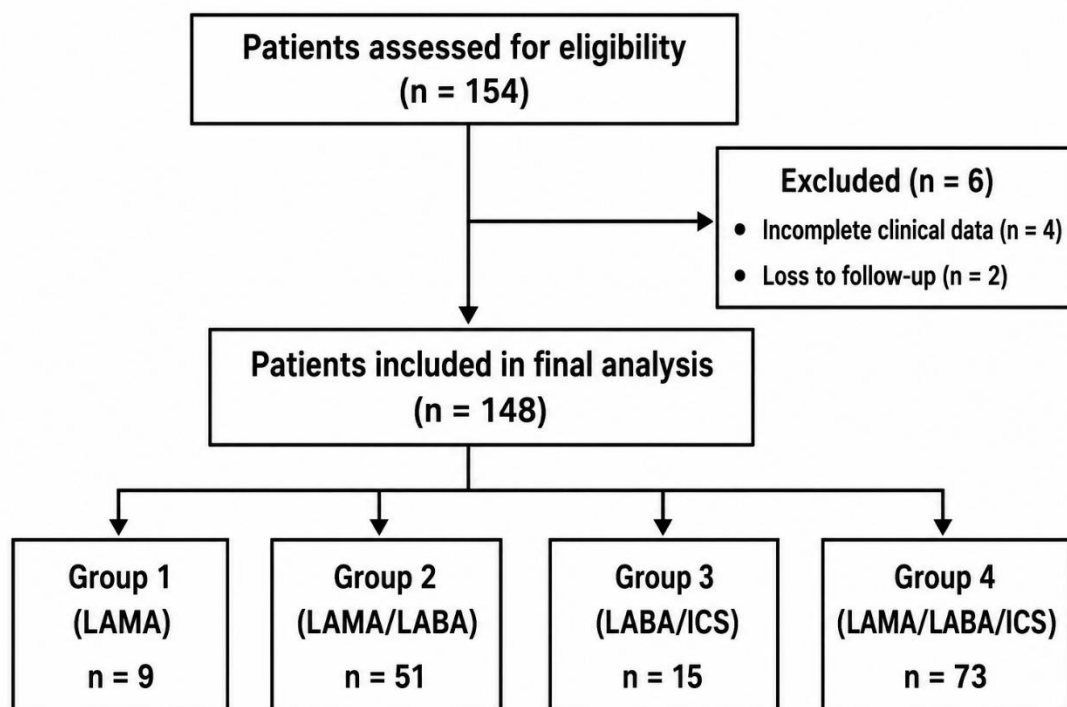


Supplementary Figure 1. Patient selection flow diagram.

Flow diagram illustrating patient screening, exclusion, and final allocation into the four inhaled treatment groups. A total of 154 patients with COPD were assessed for eligibility. Six patients were excluded because of incomplete clinical data (n = 4) or loss to follow-up (n = 2). The remaining 148 patients were included in the final analysis and categorized according to the predominant inhaled treatment regimen during the follow-up period: Group 1, LAMA monotherapy (n = 9); Group 2, LAMA/LABA (n = 51); Group 3, LABA/ICS (n = 15); and Group 4, triple therapy (LAMA/LABA/ICS) (n = 73).

Abbreviations: COPD, chronic obstructive pulmonary disease; LAMA, long-acting muscarinic antagonist; LABA, long-acting β_2 -agonist; ICS, inhaled corticosteroid.



Supplementary Table 1. Multivariable linear regression analyses for CO₂-adjusted outcomes

Variable	Δ FEV1 (%) / CO ₂ β (95% CI)	p-value	Δ mMRC / CO ₂ β (95% CI)	p-value
Group 2 vs. Group 1	-0.89 (-1.63 to -0.15)	0.018	0.032 (0.014 to 0.049)	0.001
Group 3 vs. Group 1	-1.08 (-1.92 to -0.24)	0.013	0.022 (0.002 to 0.043)	0.033
Group 4 vs. Group 1	-1.23 (-1.95 to -0.51)	0.001	0.028 (0.010 to 0.045)	0.002

Adjusted for age, sex, smoking status, baseline FEV1, baseline CAT score, and baseline mMRC score.

Abbreviations: CI, confidence interval; CAT, COPD Assessment Test; mMRC, modified Medical Research Council dyspnea scale; FEV1, forced expiratory volume in one second.

Reference group: Group 1 (LAMA monotherapy).

Group definitions: Group 1, LAMA monotherapy; Group 2, LAMA/LABA; Group 3, LABA/ICS; Group 4, triple therapy (LAMA/LABA/ICS).

Negative β coefficients for Δ FEV1 (%) / CO₂ indicate lower pulmonary function improvement per unit CO₂ emission compared with the reference group, whereas positive β coefficients for Δ mMRC / CO₂ indicate less favorable dyspnea improvement per unit CO₂ emission.