**Supplement table 1.**

|  |  |  |  |
| --- | --- | --- | --- |
| Groups | Previous exacerbation history  Total ≥2 or Severe ≥1 in the past year? | Post-FEV1%  FEV1 <50%? | Symptom  mMRC ≥2 or SGRQ ≥ 25? |
| 1 | No | No | No |
| 2 | Yes |
| 3 | Yes | No |
| 4 | Yes |
| 5 | Yes | No | No |
| 6 | Yes |
| 7 | Yes | No |
| 8 | Yes |

FEV1, forced expiratory volume in one second; mMRC, modified Medical Round Council; SGRQ, St. George Respiratory Questionnaire;

**Supplement table 2.**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Model | Criteria of  symptom group | Criteria of  risk group |  |  | Logistic models | | Cox proportional hazard models | | |
| aOR\* | 95% CI | | aHR\* | 95% CI |
| 1. Symptom: mMRC only | mMRC | Exacerbation (Total or severe) or FEV1 | A  B  C  D | 211 (34.5%)  136 (22.3%)  89 (14.6%)  175 (28.6%) | 1  2.37  1.76  2.45 | -  1.41-3.99  0.95-3.26  1.47-4.08 | | 1  1.82  1.57  2.18 | -  1.31-2.52  1.06-2.33  1.58-3.01 |
| 2. Symptom: SGRQ only | SGRQ | Exacerbation (Total or severe) or FEV1 | A  B  C  D | 169 (27.7%)  178 (29.1%)  49 (8.0%)  215 (35.2%) | 1  1.47  1.35  1.94 | -  0.88-2.46  0.63-2.87  1.17-3.23 | | 1  1.26  1.22  1.79 | -  0.91-1.75  0.74-2.02  1.30-2.46 |
| 3. Risk: FEV1 only | mMRC or SGRQ | FEV1 | A  B  C  D | 149 (24.4%)  252 (41.2%)  27 (4.4%)  183 (29.9%) | 1  1.67  0.79  1.98 | -  1.01-2.78  0.26-2.37  1.14-3.42 | | 1  1.43  0.99  1.72 | -  1.04-1.97  0.49-2.01  1.22-2.42 |
| 4. Risk: AE only (GOLD 2017) | mMRC or SGRQ | Exacerbation (Total or severe) | A  B  C  D | 162 (26.5%)  340 (55.7%)  14 (2.3%)  95 (15.6%) | 1  2.09  3.71  2.36 | -  1.29-3.39  1.12-12.28  1.26-4.43 | | 1  1.66  3.02  2.04 | -  1.24-2.25  1.52-5.99  1.37-3.04 |
| 5. Risk: total AE only | mMRC or SGRQ | Total exacerbation | A  B  C  D | 170 (27.8%)  372 (60.9%)  6 (1.0%)  63 (10.3%) | 1  1.97  4.08  2.19 | -  1.24-3.13  0.75-22.05  1.09-4.40 | | 1  1.57  3.47  2.17 | -  1.18-2.10  1.37-8.74  1.40-3.36 |
| 6. Risk: severe AE only | mMRC or SGRQ | Severe exacerbation | A  B  C  D | 166 (27.2%)  374 (61.2%)  11 (1.8%)  60 (9.8%) | 1  1.91  1.53  2.15 | -  1.20-3.03  0.36-6.51  1.06-4.37 | | 1  1.63  2.15  1.84 | -  1.22-2.17  0.97-4.77  1.15-2.93 |
| 7. Risk: FEV1 or total AE (no severe AE criteria) | mMRC or SGRQ | Total exacerbation or FEV1 | A  B  C  D | 145 (23.7%)  225 (36.8%)  31 (5.1%)  210 (34.4%) | 1  1.88  1.40  2.18 | -  1.11-3.18  0.54-3.64  1.26-3.78 | | 1  1.50  1.44  1.88 | -  1.08-2.08  0.78-2.67  1.34-2.65 |
| 8. Risk: FEV1 or severe AE (no total AE criteria) | mMRC or SGRQ | Severe exacerbation or FEV1 | A  B  C  D | 143 (23.4%)  226 (37.0%)  33 (5.4%)  209 (34.2%) | 1  1.83  1.30  2.18 | -  1.07-3.10  0.50-3.38  1.26-3.77 | | 1  1.51  1.47  1.90 | -  1.09-2.11  0.81-2.67  1.34-2.68 |
|  |  |  |  |  |  |  | |  |  |
| 9. Symptom: mMRC only, Risk: FEV1 only | mMRC | FEV1 | A  B  C  D | 240 (39.3%)  161 (26.4%)  60 (9.8%)  150 (24.6%) | 1  2.18  1.32  2.02 | -  1.35-3.51  0.65-2.65  1.22-3.34 | | 1  1.73  1.20  1.84 | -  1.28-2.33  0.77-1.88  1.34-2.51 |
| 10. Symptom: mMRC only, Risk: AE only (new proposal) | mMRC | Exacerbation (Total or severe) | A  B  C  D | 262 (42.9%)  240 (39.3%)  38 (6.2%)  71 (11.6%) | 1  2.05  1.69  2.51 | -  1.35-3.12  0.77-3.72  1.34-4.69 | | 1  1.78  1.72  2.34 | -  1.36-2.31  1.07-2.78  1.56-3.51 |
| 11. Symptom: mMRC only, Risk: total AE only | mMRC | Total exacerbation | A  B  C  D | 278 (45.5%\_  264 (43.2%)  22 (3.6%)  47 (7.7%) | 1  1.96  1.38  2.44 | -  1.31-2.93  0.50-3.87  1.19-4.99 | | 1  1.65  1.43  2.72 | -  1.28-2.13  0.75-2.69  1.75-4.25 |
| 12. Symptom: mMRC only, Risk: severe AE only | mMRC | Severe exacerbation | A  B  C  D | 280 (45.8%)  260 (42.6%)  21 (3.4%)  50 (8.2%) | 1  1.98  1.21  2.23 | -  1.32-2.96  0.43-3.41  1.10-4.52 | | 1  1.81  1.86  1.85 | -  1.41-2.34  1.05-3.30  1.13-3.02 |
| 13. Symptom: mMRC only, Risk: FEV1 or total AE (no severe AE criteria) | mMRC | Total exacerbation or FEV1 | A  B  C  D | 224 (36.7%)  146 (23.9%)  76 (12.4%)  165 (27.0%) | 1  2.12  1.38  2.20 | -  1.29-3.49  0.72-2.63  1.33-3.63 | | 1  1.66  1.29  2.03 | -  1.22-2.27  0.86-1.95  1.48-2.77 |
| 14. Symptom: mMRC only, Risk: FEV1 or severe AE (no total AE criteria) | mMRC | Severe exacerbation or FEV1 | A  B  C  D | 224 (36.7%)  145 (23.7%)  76 (12.4%)  166 (27.2%) | 1  2.29  1.57  2.25 | -  1.38-3.79  0.82-3.00  1.36-3.72 | | 1  1.86  1.55  2.05 | -  1.36-2.55  1.03-2.34  1.48-2.82 |
|  |  |  |  |  |  |  | |  |  |
| 15. Symptom: SGRQ only, Risk: FEV1 only | SGRQ | FEV1 | A  B  C  D | 240 (39.3%)  161 (26.4%)  60 (9.8%)  150 (24.6%) | 1  2.18  1.32  2.02 | -  1.35-3.51  0.65-2.65  1.22-3.34 | | 1  1.73  1.20  1.83 | -  1.28-2.33  0.77-1.88  1.34-2.51 |
| 16. Symptom: SGRQ only, Risk: AE only | SGRQ | Exacerbation (Total or severe) | A  B  C  D | 180 (29.5%)  221 (36.2%)  38 (6.2%)  172 (28.2%) | 1  1.33  0.74  1.72 | -  0.83-2.15  0.30-1.82  1.03-2.87 | | 1  1.22  0.80  1.61 | -  0.90-1.65  0.44-1.44  1.17-2.23 |
| 17. Symptom: SGRQ only, Risk: total AE only | SGRQ | Total exacerbation | A  B  C  D | 210 (34.4%)  332 (54.3%)  8 (1.3%)  4 (61%) | 1  1.57  1.83  1.91 | -  1.03-2.40  0.40-8.34  0.98-3.74 | | 1  1.42  2.18  2.05 | -  1.09-1.85  0.87-5.45  1.34-3.12 |
| 18. Symptom: SGRQ only, Risk: severe AE only | SGRQ | Severe exacerbation | A  B  C  D | 204 (33.4%)  336 (55.0%)  15 (2.4%)  56 (9.2%) | 1  1.48  0.71  2.03 | -  0.97-2.26  0.18-2.74  1.02-4.04 | | 1  1.42  1.25  1.82 | -  1.09-1.86  0.57-2.73  1.16-2.85 |
| 19. Symptom: SGRQ only, Risk: FEV1 or total AE (no severe AE criteria) | SGRQ | Total exacerbation or FEV1 | A  B  C  D | 175 (28.6%)  195 (31.9%)  43 (7.0%)  198 (32.4%) | 1  1.39  1.02  1.81 | -  0.85-2.29  0.45-2.30  1.09-3.01 | | 1  1.23  1.03  1.72 | -  0.89-1.68  0.60-1.76  1.25-2.37 |
| 20. Symptom: SGRQ only, Risk: FEV1 or severe AE (no total AE criteria) | SGRQ | Severe exacerbation or FEV1 | A  B  C  D | 172 (28.2%)  197 (32.2%)  46 (7.5%)  196 (32.1%) | 1  1.33  0.94  1.81 | -  0.81-2.19  0.42-2.09  1.09-3.01 | | 1  1.22  1.02  1.73 | -  0.89-1.68  0.60-1.72  1.25-2.38 |

mMRC, modified Medical Round Council; SGRQ, St. George Respiratory Questionnaire; FEV1, forced expiratory volume in one second

\* adjusted by age, sex, height, weight, smoking status, comorbidities including diabetes, hypertension, cardiac disease and cerebrovascular disease and medication possession ratio of respiratory medications (inhaled corticosteroid-long acting beta agonist and long-acting muscarinic antagonist)

**Supplement table 3.**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Model | Criteria of  symptom group | Criteria of  risk group | Logistic models*\** | | | Cox proportional hazard models*\** | | |
| AIC | BIC | ROC | AIC | BIC | Harrell’s C |
| 1. Symptom: mMRC only | mMRC | Exacerbation (Total or severe) or FEV1 | 691.9 | 757.4 | 0.660 | 3275.1 | 3336.2 | 0.632 |
| 2. Symptom: SGRQ only | SGRQ | Exacerbation (Total or severe) or FEV1 | 700.7 | 766.2 | 0.643 | 3286.5 | 3347.6 | 0.623 |
| 3. Risk: FEV1 only | mMRC or SGRQ | FEV1 | 698.7 | 764.1 | 0.649 | 3288.6 | 3349.7 | 0.625 |
| 4. Risk: AE only (GOLD 2017) | mMRC or SGRQ | Exacerbation (Total or severe) | 694.9 | 760.4 | 0.659 | 3281.1 | 3342.2 | 0.635 |
| 5. Risk: total AE only | mMRC or SGRQ | Total exacerbation | 696.9 | 762.3 | 0.654 | 3282.7 | 3343.8 | 0.633 |
| 6. Risk: severe AE only | mMRC or SGRQ | Severe exacerbation | 698.9 | 764.3 | 0.647 | 3286.8 | 3347.8 | 0.623 |
| 7. Risk: FEV1 or total AE (no severe AE criteria) | mMRC or SGRQ | Total exacerbation or FEV1 | 698.6 | 764.0 | 0.648 | 3286.5 | 3347.5 | 0.625 |
| 8. Risk: FEV1 or severe AE (no total AE criteria) | mMRC or SGRQ | Severe exacerbation or FEV1 | 698.6 | 764.0 | 0.647 | 3286.4 | 3347.5 | 0.623 |
|  |  |  |  |  |  |  |  |  |
| 9. Symptom: mMRC only, Risk: FEV1 only | mMRC | FEV1 | 694.4 | 759.8 | 0.656 | 3280.3 | 3341.4 | 0.626 |
| 10. Symptom: mMRC only, Risk: AE only (new proposal) | mMRC | Exacerbation (Total or severe) | 693.0 | 758.4 | 0.660 | 3274.7 | 3335.8 | 0.636 |
| 11. Symptom: mMRC only, Risk: total AE only | mMRC | Total exacerbation | 694.3 | 759.8 | 0.657 | 3275.3 | 3336.3 | 0.633 |
| 12. Symptom: mMRC only, Risk: severe AE only | mMRC | Severe exacerbation | 694.7 | 760.1 | 0.656 | 3276.9 | 3337.9 | 0.630 |
| 13. Symptom: mMRC only, Risk: FEV1 or total AE (no severe AE criteria) | mMRC | Total exacerbation or FEV1 | 694.2 | 759.6 | 0.656 | 3278.2 | 3339.3 | 0.629 |
| 14. Symptom: mMRC only, Risk: FEV1 or severe AE (no total AE criteria) | mMRC | Severe exacerbation or FEV1 | 693.2 | 758.7 | 0.657 | 3276.6 | 3337.6 | 0.630 |
|  |  |  |  |  |  |  |  |  | |
| 15. Symptom: SGRQ only, Risk: FEV1 only | SGRQ | FEV1 | 694.4 | 759.8 | 0.656 | 3280.3 | 3341.4 | 0.626 | |
| 16. Symptom: SGRQ only, Risk: AE only | SGRQ | Exacerbation (Total or severe) | 700.1 | 766.4 | 0.643 | 3288.1 | 3349.2 | 0.626 | |
| 17. Symptom: SGRQ only, Risk: total AE only | SGRQ | Total exacerbation | 701.7 | 767.1 | 0.642 | 3286.9 | 3348.0 | 0.627 | |
| 18. Symptom: SGRQ only, Risk: severe AE only | SGRQ | Severe exacerbation | 701.3 | 766.7 | 0.639 | 3290.7 | 3351.8 | 0.619 | |
| 19. Symptom: SGRQ only, Risk: FEV1 or total AE (no severe AE criteria) | SGRQ | Total exacerbation or FEV1 | 701.4 | 766.8 | 0.642 | 3287.1 | 3348.2 | 0.624 | |
| 20. Symptom: SGRQ only, Risk: FEV1 or severe AE (no total AE criteria) | SGRQ | Severe exacerbation or FEV1 | 700.9 | 766.3 | 0.642 | 3287.0 | 3348.1 | 0.625 | |

AIC, Akaike information criteria; BIC, Bayesian information criteria; AUROC, area under receiver operating curve; mMRC, modified Medical Round Council; SGRQ, St. George Respiratory Questionnaire; FEV1, forced expiratory volume in one second

\* adjusted by age, sex, height, weight, smoking status, comorbidities including diabetes, hypertension, cardiac disease and cerebrovascular disease and medication possession ratio of respiratory medications (inhaled corticosteroid-long acting beta agonist and long-acting muscarinic antagonist)