**Supplementary Table 1. Mandatory visual analogue scales (VASs) available in MASK-air.**

|  |  |
| --- | --- |
| **VASa** | **Question** |
| VAS Global Allergy Symptoms | Overall, how much are your allergic symptoms bothering you today? |
| VAS Nose | How much are your nose symptoms bothering you today? |
| VAS Eyes | How much are your eye symptoms bothering you today? |
| VAS Asthma | How much are your asthma symptoms bothering you today? |

a Each VAS is registered on a 0-100 scale, with 0 corresponding to “Not at all bothersome” and 100 corresponding to “Extremely bothersome”

**Supplementary Table 2. Demographic and clinical characteristics of assessed MASK-air® days**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Days under AIT** | **Days under no AIT** | ***p*-value** |
| **Cross-sectional Sample 1. SLIT for grass pollen allergy – *N* days=3968 (*N* users=171, 23.2 days per user)** | | | |
| *N* days (%) | 2380 (60.0) | 1588 (40.0) | - |
| Females – *N* (%) | 991 (41.6) | 809 (50.9) | 0.873 |
| Age – mean (SD) | 37.3 (12.1) | 33.7 (12.1) | <0.001 |
| Baseline number of allergy symptoms – median (IQR) | 7 (3) | 6 (2) | 0.465 |
| Baseline number of domains affected by allergya – median (IQR) | 3 (3) | 3 (3) | 0.026 |
| Asthma – *N* (%) | 814 (34.2) | 499 (31.4) | 0.569 |
| Conjunctivitis – *N* (%) | 2203 (92.6) | 1484 (93.5) | 0.875 |
| CSMSb – median (IQR) | 8.2 (14.2) | 8.6 (17.3) | <0.001 |
| Three highest CSMSs – median (IQR) | 21.7 (19.2) | 27.4 (20.4) | - |
| VAS global – median (IQR) | 9 (23) | 10 (26) | <0.001 |
| VAS eye – median (IQR) | 2 (13) | 5 (21) | <0.001 |
| VAS nose – median (IQR) | 10 (25) | 11 (25) | 0.005 |
| VAS asthma – median (IQR) | 0 (4) | 0 (5) | <0.001 |
| Rhinitis medication days – *N* (%) |  |  |  |
| No medication | 1132 (47.6) | 827 (52.1) | - |
| Monotherapy | 815 (34.2) | 510 (32.1) | 0.035 |
| Comedication | 433 (18.2) | 251 (15.8) | 0.009 |
| Asthma medication days – *N* (%) |  |  |  |
| No medication | 1861 (78.2) | 1397 (88.0) | - |
| Monotherapy | 453 (19.0) | 188 (11.8) | 0.073 |
| Comedication | 66 (2.8) | 3 (0.2) | 0.014 |
| **Cross-sectional Sample 2. SLIT tablets for grass pollen allergy – *N* days=2311 (*N* users=111, 20.8 days per user)** | | | |
| *N* days (%) | 1341 (58.0) | 970 (42.0) | - |
| Females – *N* (%) | 569 (42.4) | 463 (47.7) | 0.652 |
| Age – mean (SD) | 35.0 (13.8) | 31.7 (12.4) | 0.030 |
| Baseline number of allergy symptoms – median (IQR) | 5 (3) | 5 (2) | 0.384 |
| Baseline number of domains affected by allergya – median (IQR) | 2 (2) | 3 (2) | 0.324 |
| Asthma – *N* (%) | 491 (36.6) | 327 (33.7) | 0.361 |
| Conjunctivitis – *N* (%) | 1174 (87.5) | 889 (91.6) | 0.873 |
| CSMSb – median (IQR) | 9.3 (14.4) | 12.1 (19.3) | <0.001 |
| Three highest CSMSs – median (IQR) | 22.2 (20.4) | 26.0 (18.9) | - |
| VAS global – median (IQR) | 12 (21) | 15 (26) | 0.005 |
| VAS eye – median (IQR) | 4 (18) | 10 (24) | <0.001 |
| VAS nose – median (IQR) | 11 (22) | 13 (22) | 0.036 |
| VAS asthma – median (IQR) | 0 (7) | 0 (9) | <0.001 |
| Rhinitis medication days – *N* (%) |  |  |  |
| No medication | 505 (37.7) | 382 (39.4) | - |
| Monotherapy | 588 (43.8) | 438 (45.2) | 0.022 |
| Comedication | 248 (18.5) | 150 (15.5) | 0.368 |
| Asthma medication days – *N* (%) |  |  |  |
| No medication | 1039 (77.5) | 867 (89.4) | - |
| Monotherapy | 239 (17.8) | 101 (10.4) | 0.169 |
| Comedication | 63 (4.7) | 2 (0.2) | 0.033 |
| **Cross-sectional Sample 3. SLIT for grass pollen allergy in users reporting AIT use for at least one day – *N* days=3098 (*N* users=113, 27.4 days per user)** | | | |
| *N* days (%) | 2380 (76.8) | 718 (23.2) | - |
| Females – *N* (%) | 991 (41.6) | 225 (31.3) | 0.312 |
| Age – mean (SD) | 37.3 (12.1) | 37.6 (9.1) | 0.004 |
| Baseline *N* of allergy symptoms – median (IQR) | 7 (3) | 6 (3) | 0.632 |
| Baseline *N* of domains affected by allergya – median (IQR) | 3 (3) | 3 (3) | 0.087 |
| Asthma – *N* (%) | 814 (34.2) | 205 (28.6) | 0.218 |
| Conjunctivitis – *N* (%) | 2203 (92.6) | 690 (96.1) | 0.301 |
| CSMSb – median (IQR) | 8.2 (14.2) | 9.2 (15.3) | <0.001 |
| Three highest CSMSs – median (IQR) | 20.6 (19.0) | 19.8 (21.9) | - |
| VAS global – median (IQR) | 9 (23) | 10 (25) | <0.001 |
| VAS eye – median (IQR) | 2 (13) | 5 (20) | <0.001 |
| VAS nose – median (IQR) | 10 (25) | 12 (20) | 0.029 |
| VAS asthma – median (IQR) | 0 (4) | 0 (7) | <0.001 |
| Rhinitis medication days – *N* (%) |  |  |  |
| No medication | 1132 (47.6) | 270 (37.6) | - |
| Monotherapy | 815 (34.2) | 301 (41.9) | 0.077 |
| Comedication | 433 (18.2) | 147 (20.5) | 0.009 |
| Asthma medication days – *N* (%) |  |  |  |
| No medication | 1861 (78.2) | 592 (82.5) | - |
| Monotherapy | 453 (19.0) | 124 (17.3) | 0.111 |
| Comedication | 66 (2.8) | 2 (0.3) | 0.027 |
| **Longitudinal Sample. SLIT for grass pollen allergy in users reporting AIT use for at least one day (data from periods of two weeks) – *N* days=2615 (*N* users=45, 58.1 days per user)** | | | |
| *N* days (%) | 2026 (77.5) | 589 (22.5) | - |
| Females – *N* (%) | 1254 (61.9) | 416 (70.6) | 0.435 |
| Age – mean (SD) | 37.7 (12.2) | 39.3 (7.8) | <0.001 |
| Baseline *N* of allergy symptoms – median (IQR) | 7 (3) | 6 (3) | 0.535 |
| Baseline *N* of domains affected by allergya – median (IQR) | 3 (2) | 3 (3) | 0.544 |
| Asthma – *N* (%) | 613 (30.3) | 163 (27.7) | 0.985 |
| Conjunctivitis – *N* (%) | 1885 (93.0) | 588 (99.8) | 0.105 |
| CSMSb – median (IQR) | 8.4 (14.3) | 10.9 (15.8) | <0.001 |
| VAS global – median (IQR) | 10 (24) | 13 (26) | <0.001 |
| VAS eye – median (IQR) | 2 (13) | 9 (22) | <0.001 |
| VAS nose – median (IQR) | 12 (26) | 14 (18) | 0.019 |
| VAS asthma – median (IQR) | 0 (3) | 0 (9) | <0.001 |
| Rhinitis medication days – *N* (%) |  |  |  |
| No medication | 896 (44.2) | 183 (31.1) | - |
| Monotherapy | 770 (38.0) | 257 (43.6) | 0.212 |
| Comedication | 360 (17.8) | 149 (25.3) | <0.001 |
| Asthma medication days – *N* (%) |  |  |  |
| No medication | 1580 (78.0) | 487 (82.7) | - |
| Monotherapy | 412 (20.3) | 100 (17.0) | <0.001 |
| Comedication | 34 (1.7) | 2 (0.3) | 0.036 |

AIT=Allergen immunotherapy; CSMS: Combined symptom-medication score; IQR=Interquartile range; SD=Standard-deviation; SLIT=Sublingual immunotherapy; VAS = Visual analogue scale. a Assessed domains include sleep, daily activities, participation in school or work or general trouble; b The CSMS was always calculated based on the formula [(0.037 × VAS Global Symptoms) + (0.033 × VAS Eyes) + (0.020 × VAS Nose) + (0.027 × VAS Asthma) + (0.450 if azelastine-fluticasone is used) + (0.424 if nasal steroids are used) + (0.243 if asthma medication is used) + (0.380 if other rhinitis relief medication is used)] × 7.577). The rationale and procedures for its development and assessment of properties (validity, reliability and responsiveness) are described in Sousa-Pinto B et al. Allergy;77(7):2147.2162.

**Supplementary Table 3. Country distribution of MASK-air® days**

|  |  |  |
| --- | --- | --- |
|  | **All days of patients using grass pollen immunotherapy – *N* (%)** | **All days of patients using grass pollen SLIT – *N* (%)** |
| Austria | 118 (1.4) | 13 (0.4) |
| Belgium | 101 (1.2) | 101 (2.5) |
| Czech Republic | 49 (0.6) | 0 |
| Denmark | 3 (0.03) | 3 (0.1) |
| Finland | 119 (1.4) | 107 (2.7) |
| France | 665 (7.6) | 654 (16.5) |
| Germany | 2084 (24.0) | 484 (12.2) |
| Great Britain | 37 (0.4) | 21 (0.5) |
| Greece | 244 (2.8) | 16 (0.4) |
| Italy | 1345 (15.5) | 997 (25.1) |
| Lithuania | 1829 (21.0) | 1146 (28.9) |
| Netherlands | 106 (1.2) | 16 (0.4) |
| Poland | 832 (9.6) | 15 (0.4) |
| Portugal | 244 (2.8) | 91 (2.3) |
| Spain | 295 (3.4) | 34 (0.9) |
| Sweden | 69 (0.8) | 66 (1.7) |
| Switzerland | 554 (6.4) | 204 (5.1) |

SLIT=Sublingual immunotherapy

**Supplementary Table 4. Multivariable mixed-effects regression models assessing the association between use of sublingual immunotherapy for grass pollen and allergic rhinitis control, in users reporting at least 4 MASK-air® days (and at least one day under immunotherapy) and considering only patients (A) with high (>20/100) median or high range of combined symptom-medication score (CSMS), or (B) with low (≤20/100) median CSMS**

|  |  |  |
| --- | --- | --- |
|  | **Association with the CSMS – regression coefficient (95%CI)** | **Association with VAS global – regression coefficient (95%CI)** |
| **A. Patients with high median or high range of CSMS – *N* days=2351 (*N* users=53)** | | |
| **Use of immunotherapy** | -2.7 (-3.8;-1.6) | -4.1 (-5.9;-2.4) |
| **Male sex** | -2.7 (-8.3;2.8) | -4.1 (-12.7;4.5) |
| **Age** | -0.4 (-0.6;-0.2) | -0.4 (-0.8;-0.1) |
| **Baseline impact a** | 0.2 (-1.8;2.1) | 0.02 (-3.0;3.1) |
| **Baseline symptoms** | -1.4 (-3.4;0.6) | -1.4 (-4.5;1.7) |
| **Asthma** | 0.1 (-5.5;5.8) | -2.5 (-11.3;6.3) |
| **Conjunctivitis** | 11.7 (0.6;22.8) | 10.9 (-6.3;28.1) |
| **Use of rhinitis medication** |  |  |
| **No medication** | -b | -b |
| **Monotherapy** | 5.4 (4.3;6.4) | 6.5 (4.9;8.2) |
| **Comedication** | 10.5 (9.2;11.8) | 11.0 (8.8;13.1) |
| **Use of asthma medication** |  |  |
| **No medication** | -b | -b |
| **Monotherapy** | 2.8 (0.8;4.8) | 0.5 (-2.7;3.7) |
| **Comedication** | 3.4 (-0.7;7.5) | 0.9 (-5.7;7.4) |
| **B. Patients with low median CSMS – *N* days=712 (*N* users=21)** | | |
| **Use of immunotherapy** | -2.1 (-3.0;-1.2) | -3.1 (-4.5;-1.6) |
| **Male sex** | -0.2 (-3.7;3.3) | -0.04 (-6.0;5.9) |
| **Age** | -0.2 (-0.3;-0.04) | -0.3 (-0.6;-0.1) |
| **Baseline impact a** | -0.7 (-1.9;0.5) | -1.3 (-3.3;0.8) |
| **Baseline symptoms** | 0.02 (-1.2;1.3) | 0.6 (-1.5;2.7) |
| **Asthma** | -1.5 (-5.2;2.1) | -3.7 (-9.9;2.4) |
| **Conjunctivitis** | 2.0 (-4.2;8.2) | -0.5 (-11.1;10.0) |
| **Use of rhinitis medication** |  |  |
| **No medication** | -b | -b |
| **Monotherapy** | 4.7 (3.9;5.5) | 5.5 (4.2;6.8) |
| **Comedication** | 8.7 (7.6;9.8) | 8.1 (6.3;9.9) |
| **Use of asthma medication** |  |  |
| **No medication** | -b | -b |
| **Monotherapy** | 4.7 (3.0;6.4) | 4.1 (1.3;6.9) |
| **Comedication** | 7.5 (3.5;11.5) | 9.9 (3.2;16.6) |

CI: Confidence interval; VAS: Visual analogue scale; a Number of domains affected by allergy; b Reference category

**Supplementary Table 5. Multivariable mixed-effects regression models assessing the association between use of sublingual immunotherapy (SLIT) for grass pollen in the previous day and allergic rhinitis control**

|  |  |  |
| --- | --- | --- |
|  | **Association with the CSMS – regression coefficient (95%CI) [*p*-value]** | **Association with VAS global – regression coefficient (95%CI) [*p*-value]** |
| **A. All days when SLIT had been used in the previous day** | | |
| **Use of immunotherapy** | -2.4 (-3.5;-1.4) [<0.001] | -3.7 (-5.4;-2.0) [<0.001] |
| **Male sex** | -3.5 (-7.6;0.6) [0.095]a | -5.8 (-11.7;0.2) [0.061]a |
| **Age** | -0.2 (-0.3;-0.1) [0.008]a | -0.3 (-0.5;-0.1) [0.016]a |
| **Baseline impact b** | -0.4 (-2.1;1.2) [0.583]a | -0.5 (-2.9;1.9) [0.680]a |
| **Baseline symptoms** | -0.2 (-1.7;1.4) [0.844]a | -0.3 (-2.6;2.1) [0.825]a |
| **Asthma** | -2.3 (-6.4;1.7) [0.266]a | -5.0 (-10.9;1.0) [0.103]a |
| **Conjunctivitis** | 4.7 (-3.2;12.6) [0.245]a | 6.9 (-4.7;18.5) [0.246]a |
| **Use of rhinitis medication** |  |  |
| **No medication** | -c | -c |
| **Monotherapy** | 3.9 (3.0;4.8) [<0.001] | 4.5 (3.1;5.9) [<0.001] |
| **Comedication** | 8.3 (7.1;9.5) [<0.001] | 7.9 (6.0;9.8) [<0.001] |
| **Use of asthma medication** |  |  |
| **No medication** | -c | -c |
| **Monotherapy** | 3.6 (1.9;5.4) [<0.001] | 1.5 (-1.2;4.3) [0.280]a |
| **Comedication** | 1.6 (-2.7;5.9) [0.473]a | -3.7 (-10.5;3.2) [0.297]a |
| **B. Days with no use of SLIT but in which SLIT had been used in the previous day** | | |
| **Use of immunotherapy** | -2.2 (-4.8;-0.4) [0.093]a | -3.2 (-7.2;0.7) [0.109]a |
| **Male sex** | -6.6 (-12.3;-0.9) [0.028]a | -11.1 (-20.3;-1.8) [0.022]a |
| **Age** | -0.1 (-0.3;0.1) [0.216]a | -0.2 (-0.5;0.2) [0.350]a |
| **Baseline impact b** | -1.7 (-4.2;0.8) [0.197]a | -2.1 (-6.1;1.9) [0.309]a |
| **Baseline symptoms** | 0.4 (-1.9;2.8) [0.728]a | 1.8 (-2.0;5.5) [0.360]a |
| **Asthma** | -5.3 (-11.2;0.7) [0.088]a | -9.1 (-18.6;0.3) [0.063]a |
| **Conjunctivitis** | 3.9 (-7.5;15.4) [0.505]a | 0.5 (-18.1;19.0) [0.959]a |
| **Use of rhinitis medication** |  |  |
| **No medication** | -c | -c |
| **Monotherapy** | 2.0 (0.4;3.6) [0.017]a | 0.7 (-1.8;3.2) [0.578]a |
| **Comedication** | 9.7 (7.5;11.9) [<0.001] | 9.0 (5.6;12.3) [<0.001] |
| **Use of asthma medication** |  |  |
| **No medication** | -c | -c |
| **Monotherapy** | 3.1 (0.6;5.6) [0.015]a | 1.7 (-2.1;5.5) [0.386]a |
| **Comedication** | -5.4 (-32.2;21.3) [0.603]a | -8.3 (-51.4;34.8) [0.706]a |

CI: Confidence interval; CSMS: Combined symptom-medication score; VAS: Visual analogue scale; a Not statistically significant after Bonferroni-Holm correction; b Number of domains affected by allergy; c Reference category.

**Supplementary Table 6. Multivariable mixed-effects regression models assessing the association between use of sublingual immunotherapy for grass pollen and allergic rhinitis control in periods of two weeks (missing at most an average of two days per week) of sample 3 users.**

|  |  |  |
| --- | --- | --- |
|  | **Association with the CSMS – regression coefficient (95%CI)** | **Association with VAS global – regression coefficient (95%CI)** |
| **Use of immunotherapy** | -2.6 (-3.6;-1.6) [<0.001] | -4.0 (-5.6;-2.3) [<0.001] |
| **Male sex** | -1.6 (-7.7;4.5) [0.617]a | -1.6 (-10.1;6.8) [0.710]a |
| **Age** | -0.4 (-0.6;-0.1) [0.003]a | -0.4 (-0.7;-0.1) [0.018]a |
| **Baseline impactb** | -0.6 (-2.7;1.5) [0.597]a | -1.1 (-4.1;1.8) [0.444]a |
| **Baseline symptoms** | -1.2 (-3.4;1.0) [0.290]a | -1.4 (-4.4;1.7) [0.387]a |
| **Asthma** | 1.1 (-5.1;7.4) [0.725]a | -0.2 (-8.9;8.6) [0.973]a |
| **Conjunctivitis** | 10.3 (-3.1;23.7) [0.145]a | 15.0 (-3.6;33.5) [0.124]a |
| **Use of rhinitis medication** |  |  |
| **No medication** | -c | -c |
| **Monotherapy** | 4.1 (3.2;5.0) [<0.001] | 4.9 (3.5;6.3) [<0.001] |
| **Comedication** | 8.7 (7.6;9.8) [<0.001] | 7.9 (6.1;9.7) [<0.001] |
| **Use of asthma medication** |  |  |
| **No medication** | -c | -c |
| **Monotherapy** | 4.8 (2.9;6.7) [<0.001] | 2.9 (-0.1;6.0) [0.061]a |
| **Comedication** | 1.6 (-1.8;5.1) [0.358]a | -2.8 (-8.4;2.7) [0.318]a |

CI: Confidence interval; VAS: Visual analogue scale; a Not statistically significant after Bonferroni-Holm correction; b Number of domains affected by allergy; c Reference category