Supplemental Appendix 2

**Determination of threshold values for detecting an apnea-hypopnea index (AHI) >5, >15 and >30 events/hr**

**Table 1:** Statistics observed in the derivation group for multiple threshold values of the DES-OSA score in terms of number of True Positives (TP), True Negatives (TN), False Positives (FP), False Negatives (FN), Sensitivity (Se), Specificity (Sp), sum of Sensitivity and Specificity (Se+Sp), Positive Predictive value (PPV), Negative predictive value (NPV), and Cohen Kappa coefficient at detecting an AHI >5, >15 and >30 events/hr. Highlighted cells represent the threshold values with best statistical results.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Th | TP  (n=) | TN  (n=) | FP  (n=) | FN  (n=) | Se  (95% CI) | Sp  (95% CI) | Se + Sp | PPV  (TP/TP+FP) | NPV  (TN/TN+FN) | Kappa |
| AHI >5  events/hr | 1 | 110 | 0 | 29 | 0 | 1.000  (0.958 to 1.000) | 0.000  (0.000 to 0.142) | 1.000 | 0.791  (110/139) | /  (0/0) | 0.000  (0.000 to 0.000) |
| 2 | 110 | 3 | 26 | 0 | 1.000  (0.958 to 1.000) | 0.103  (0.029 to 0.274) | 1.103 | 0.809  (110/136) | 1.000  (3/3) | 0.154  (-0.002 to 0.311) |
| 3 | 108 | 4 | 25 | 2 | 0.982  (0.931 to 0.999) | 0.138  (0.050 to 0.313) | 1.120 | 0.812  (108/133) | 0.667  (4/6) | 0.169  (-0.003 to 0.341) |
| 4 | 102 | 12 | 17 | 8 | 0.927  (0.860 to 0.964) | 0.414  (0.256 to 0.593) | 1.341 | 0.857  (102/119) | 0.600  (12/20) | 0.385  (0.192 to 0.578) |
| 5 | 91 | 21 | 8 | 19 | 0.827  (0.745 to 0.887) | 0.724  (0.540 to 0.854) | 1.551 | 0.919  (91/99) | 0.525  (21/30) | 0.484  (0.319 to 0.648) |
| 6 | 74 | 24 | 5 | 36 | 0.673  (0.580 to 0.753) | 0.828  (0.648 to 0.927) | 1.500 | 0.937  (74/79) | 0.400  (24/60) | 0.359  (0.217 to 0.501) |
| 7 | 55 | 27 | 2 | 55 | 0.500  (0.408 to 0.592) | 0.931  (0.767 to 0.990) | 1.431 | 0.965  (55/57) | 0.329  (27/82) | 0.258  (0.149 to 0.366) |
| 8 | 32 | 28 | 1 | 78 | 0.291  (0.214 to 0.382) | 0.966  (0.811 to 1.000) | 1.256 | 0.970  (32/33) | 0.264  (28/106) | 0.130  (0.060 to 0.200) |
| 9 | 12 | 29 | 0 | 98 | 0.109  (0.063 to 0.183) | 1.000  (0.858 to 1.000) | 1.109 | 1.000  (12/12) | 0.228  (29/127) | 0.049  (0.017 to 0.080) |
| 10 | 2 | 29 | 0 | 108 | 0.018  (0.001 to 0.069) | 1.000  (0.858 to 1.000) | 1.018 | 1.000  (2/2) | 0.212  (29/137) | 0.008  (-0.003 to 0.019) |
| AHI >15  events/hr | 1 | 83 | 0 | 56 | 0 | 1.000  (0.946 to 1.000) | 0.000  (0.000 to 0.079) | 1.000 | 0.597  (83/139) | /  (0/0) | 0.000  (0.000 to 0.000) |
| 2 | 83 | 3 | 53 | 0 | 1.000  (0.946 to 1.000) | 0.054  (0.013 to 0.153) | 1.054 | 0.610  (83/136) | 1.000  (3/3) | 0.063  (-0.006 to 0.133) |
| 3 | 83 | 6 | 50 | 0 | 1.000  (0.946 to 1.000) | 0.107  (0.047 to 0.219) | 1.107 | 0.624  (83/133) | 1.000  (6/6) | 0.125  (0.031 to 0.219) |
| 4 | 79 | 16 | 40 | 4 | 0.952  (0.878 to 0.984) | 0.286  (0.184 to 0.416) | 1.238 | 0.664  (79/119) | 0.800  (16/20) | 0.265  (0.126 to 0.405) |
| 5 | 73 | 30 | 26 | 10 | 0.880  (0.790 to 0.935) | 0.536  (0.407 to 0.660) | 1.415 | 0.737  (73/99) | 0.750  (30/40) | 0.435  (0.284 to 0.587) |
| 6 | 64 | 41 | 15 | 19 | 0.771  (0.669 to 0.849) | 0.732  (0.603 to 0.831) | 1.503 | 0.810  (64/79) | 0.683  (41/60) | 0.497  (0.352 to 0.643) |
| 7 | 49 | 48 | 8 | 34 | 0.590  (0.483 to 0.690) | 0.857  (0.839 to 0.928) | 1.448 | 0.860  (49/57) | 0.585  (48/82) | 0.416  (0.278 to 0.554) |
| 8 | 29 | 52 | 4 | 54 | 0.349  (0.256 to 0.457) | 0.929  (0.824 to 0.976) | 1.278 | 0.879  (29/33) | 0.491  (52/106) | 0.243  (0.128 to 0.358) |
| 9 | 11 | 55 | 1 | 72 | 0.133  (0.075 to 0.224) | 0.982  (0.895 to 1.000) | 1.115 | 0.917  (11/12) | 0.433  (55/127) | 0.095  (0.025 to 0.165) |
| 10 | 2 | 56 | 0 | 81 | 0.024  (0.002 to 0.090) | 1.000  (0.921 to 1.000) | 1.024 | 1.000  (2/2) | 0.409  (56/137) | 0.019  (-0.008 to 0.047) |
| AHI >30  events/hr | 1 | 48 | 0 | 91 | 0 | 1.000  (0.909 to 1.000) | 0.000  (0.000 to 0.050) | 1.000 | 0.345  (48/139) | /  (0/0) | 0.000  (0.000 to 0.000) |
| 2 | 48 | 3 | 88 | 0 | 1.000  (0.909 to 1.000) | 0.033  (0.008 to 0.098) | 1.033 | 0.353  (48/136) | 1.000  (3/3) | 0.023  (-0.003 to 0.049) |
| 3 | 48 | 6 | 85 | 0 | 1.000  (0.909 to 1.000) | 0.066  (0.028 to 0.140) | 1.066 | 0.361  (48/133) | 1.000  (6/6) | 0.046  (0.008 to 0.085) |
| 4 | 48 | 20 | 71 | 0 | 1.000  (0.909 to 1.000) | 0.220  (0.147 to 0.316) | 1.220 | 0.403  (48/119) | 1.000  (20/20) | 0.163  (0.088 to 0.237) |
| 5 | 44 | 36 | 55 | 4 | 0.917  (0.798 to 0.971) | 0.396  (0.301 to 0.499) | 1.312 | 0.444  (44/99) | 0.900  (36/40) | 0.250  (0.136 to 0.363) |
| 6 | 43 | 55 | 36 | 5 | 0.896  (0.773 to 0.958) | 0.604  (0.501 to 0.699) | 1.500 | 0.544  (43/79) | 0.917  (55/60) | 0.434  (0.302 to 0.566) |
| 7 | 36 | 70 | 21 | 12 | 0.750  (0.610 to 0.851) | 0.769  (0.672 to 0.844) | 1.519 | 0.632  (36/57) | 0.854  (70/82) | 0.497  (0.050 to 0.644) |
| 8 | 25 | 83 | 8 | 23 | 0.521  (0.383 to 0.665) | 0.912  (0.833 to 0.956) | 1.433 | 0.758  (25/33) | 0.783  (83/106) | 0.467  (0.312 to 0.623) |
| 9 | 11 | 90 | 1 | 37 | 0.229  (0.132 to 0.368) | 0.989  (0.933 to 1.000) | 1.218 | 0.917  (11/12) | 0.709  (90/127) | 0.265  (0.125 to 0.405) |
| 10 | 2 | 91 | 0 | 46 | 0.042  (0.004 to 0.149) | 1.000  (0.950 to 1.000) | 1.042 | 1.000  (2/2) | 0.664  (91/137) | 0.054  (-0.018 to 0.126) |

**Probit analyses**

**Table 2:** Probit model parameters estimation in the derivation group. Pairs of data for each patient were used for these analyses, namely the DES-OSA score and AHI. Model parameters estimations are given, with their respective statistical significance and 95 % confidence interval (95 % CI).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Estimation** | **Standard error** | **Z** | **P** | **95% CI** | |
|  | **Inferior limit** | **Superior limit** |
| **AHI > 5 events/hr** | DES-OSA score | 0.422 | 0.081 | 5.190 | < 0.001 | 0.262 | 0.581 |
| Constant | -1.374 | 0.416 | 3.305 | 0.001 | -2.189 | -0.559 |
| **AHI > 15 events/hr** | DES-OSA score | 0.401 | 0.068 | 5.899 | < 0.001 | 0.268 | 0.534 |
| Constant | -2.024 | 0.399 | 5.075 | < 0.001 | -2.805 | -1.242 |
| **AHI > 30 events/hr** | DES-OSA score | 0.477 | 0.080 | 5.994 | < 0.001 | 0.321 | 0.633 |
| Constant | -3.353 | 0.526 | 6.373 | < 0.001 | -4.384 | -2.322 |

**Table 3:** Theoretical DES-OSA scores that are associated with a given probability of an AHI >5, >15 or >30 events/hr, as well as their 95 % CI, and according to our Probit models. Highlighted cells correspond to the threshold values selected according to sensitivity, specificity, and Cohen Kappa coefficient analyses performed in the derivation group (see above).

|  |  |  |
| --- | --- | --- |
| **DERIVATION GROUP** | | |
|  | **Probability** | **DES-OSA** | **95% CI** | |
| **Inferior limit** | **Superior limit** |
| AHI > 5 events/hr | 0.01 | -2.260 | -6.636 | -0.241 |
| 0.05 | -0.643 | -4.060 | 0.954 |
| 0.10 | 0.219 | -2.692 | 1.597 |
| 0.20 | 1.263 | -1.046 | 2.386 |
| 0.30 | 2.015 | 0.128 | 2.967 |
| 0.40 | 2.658 | 1.117 | 3.478 |
| 0.50 | 3.259 | 2.020 | 3.977 |
| 0.60 | 3.860 | 2.886 | 4.514 |
| 0.70 | 4.503 | 3.741 | 5.158 |
| 0.80 | 5.256 | 4.608 | 6.047 |
| 0.90 | 6.300 | 5.595 | 7.495 |
| 0.95 | 7.162 | 6.309 | 8.791 |
| 0.99 | 8.778 | 7.562 | 11.310 |
| AHI > 15 events/hr | 0.01 | -0.755 | -3.997 | 0.910 |
| 0.05 | 0.946 | -1.478 | 2.215 |
| 0.10 | 1.853 | -0.144 | 2.920 |
| 0.20 | 2.951 | 1.453 | 3.791 |
| 0.30 | 3.743 | 2.580 | 4.444 |
| 0.40 | 4.419 | 3.510 | 5.036 |
| 0.50 | 5.052 | 4.328 | 5.639 |
| 0.60 | 5.684 | 5.071 | 6.318 |
| 0.70 | 6.361 | 5.771 | 7.139 |
| 0.80 | 7.152 | 6.494 | 8.195 |
| 0.90 | 8.250 | 7.410 | 9.748 |
| 0.95 | 9.157 | 8.132 | 11.065 |
| 0.99 | 10.858 | 9.451 | 13.571 |
| AHI > 30 events/hr | 0.01 | 2.152 | -0.014 | 3.296 |
| 0.05 | 3.580 | 2.066 | 4.415 |
| 0.10 | 4.342 | 3.156 | 5.031 |
| 0.20 | 5.264 | 4.433 | 5.819 |
| 0.30 | 5.929 | 5.293 | 6.448 |
| 0.40 | 6.497 | 5.956 | 7.057 |
| 0.50 | 7.028 | 6.508 | 7.694 |
| 0.60 | 7.559 | 7.005 | 8.386 |
| 0.70 | 8.127 | 7.499 | 9.165 |
| 0.80 | 8.792 | 8.048 | 10.105 |
| 0.90 | 9.714 | 8.783 | 11.436 |
| 0.95 | 10.476 | 9.377 | 12.546 |
| 0.99 | 11.904 | 10.478 | 14.644 |

**Figure 1:** Probit model of the relationship between DES-OSA score and the probability of at least mild (blue line, AHI >5 events/hr), moderate to severe (red line, AHI >15 events/hr), and severe (green line, AHI >30 events/hr) obstructive sleep apnea (OSA). AHI = Apnea Hypopnea Index (number of apnea or hypopnea per hour). Dashed lines correspond to the 95% CI of each model.

