Effect Of Scoring Rules And Cut-Offs For Apnea-Hypopnea Index (ahi) In Clinical And Research Populations

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Introduction: Severity of sleep disordered breathing (SDB) is measured using the AHI defined using various associations of hypopnea with desaturation and arousal. Ruehland (Sleep 2009; 32:150) recently showed that these different definitions of AHI have some degree of correspondence in classifying patients, if used with an appropriate cutoff for each index. The present study extends these observations in large clinical and research datasets from 2 laboratories including home and in-lab studies.

Methods: We retrospectively examined diagnostic in-laboratory PSGs and in-home limited channel studies in two sleep centers (n for Lab-1 =520, Lab-2 =629, HOME-1 =311, HOME-2=501). Lab-1 used Sandman, Lab-2 used Compumedics Profusion, Home-1 used Compumedics Somte equipment on clinical patient referrals, and Home-2 used Ares on research subjects. Studies were scored manually using one of the AASM criteria: events identified from the flow signal were classified as apnea if flow<10%; hypopneas were counted if associated with 3% desaturation (AHI3), 4% desaturation (AHI4), 3% desaturation or arousal (AHI3A) or 4% desaturation or arousal (AHI4A), but all studies were scored using at least the AHI4 criteria and one other. Bias, corresponding best cut-off (for 5, 15, 30 events/hr), and sensitivity/specificity of the best (maximum specificity+sensitivity) cut-off were calculated comparing AHI4 to the other AHI algorithm used.

Results (table): all definitions of AHI including arousal produced indices between 5-16 greater than the AHI4 in the same subjects. This bias was the same for "SDB" defined by AHI4 of >5, >15 or >30 events/hr but varied with type of population. If no cut-off adjustment was made for the diagnosis of SDB, 14.6% of LAB-1 subjects with AHI4<5 had AHI3>5 and 45% of subjects with AHI4<5 had AHI3A>5. Similar percentages were seen in the other datasets. Rows 5-10 of Table show the best cut-offs for each dataset comparing each alternate AHI to AHI4. These values were generally about 15 events per hour higher than the cut-off by AHI4. Using the AHI4 for comparison, sensitivity and specificity of the alternative indices using appropriately adjusted cut-offs was generally high (85-100%).

table.gif

Conclusions: As expected, definitions of hypopnea with and without arousal criteria result in large differences in diagnosing SDB (as high as 45% of subjects are reclassified in a clinical population and 38.5% in a research population). The cut-off if using arousal in defining hypopnea must be adjusted by ~15 events/hr to be comparable to an AHI4 cutoff and keep agreement in classification to >83%.