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Title: Accuracy of residual events detection in a bench test and in clinical practice

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Body: Introduction. Automatic CPAP (A-CPAP) devices are useful in obtaining optimal fixed CPAP pressure for sleep apnea-hypopnea syndrome (SAHS) treatment. They provide information about residual events [apnea-hypopnea index (AHI) and leaks]. Our aim was to determine the accuracy of three different A-CPAP devices in estimating residual AHI and its usefulness in clinical practice. Methods. We used a computer-driven model simulating a SAHS patient (Farre et al 2002) to reproduce 27 residual patterns of disturbed breathing of 4 hours. We compared the simulated AHI with the AHI values detected by 3 different A-CPAPs: S9 Autoset, Remstar Auto and Goodknight 420E. In addition, 17 consecutive SAHS patients were titrated by using the A-CPAP AutoSet Spirit II S8 and who performed simultaneously a respiratory polygraphy with the Somte PSG device (Compumedics). Patients' residual events were blindly scored following the AASM criteria by an expert physician and compared to the ones detected by the A-CPAP. Results. The simulated AHI mean value was 6.31 ± 7.19 and the AHI detected by the A-CPAP devices was 7.43 ± 8.82, finding a Pearson correlation of r=0.95 ($p<0.01$) for the three devices. Analyzing the correlation separately, we found r values of 0.999 for the S9 ($p<0.01$), 0.994 ($p<0.01$) for the Remstar and 0.995 ($p<0.01$) for the Goodknight. In patients, the residual AHI mean value estimated by the S8 was 13.47 ± 9.82 compared to the manually scored 7.02 ± 4.49. The correlation between them was 0.857 ($p<0.01$). Conclusions. The A-CPAP devices evaluated in this study showed a good level of accuracy in estimating residual AHI in simulated SAHS patients, which is slightly lower in the case of real patients.