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Title: Counting coughs: Visual information influences auditory analysis

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Body: Introduction Coughs are defined by their characteristic sound and the gold standard for determining cough frequency is by ear (Smith, J. et al. Cough 2006; 2:6). Audio editing software can be used to display graphs of sound amplitude. We measured the effect of visual information on cough counting. Methods 24h recordings were made from 3 patients with cough with the PulmoTrack™ cough monitor (KarmelSonix, Haifa, Israel). A 20-minute audio sequence from each patient was played to 10 respiratory physicians on 3 occasions with intervals of >4 weeks. No visual information was displayed on the first two occasions but on the third occasion Audacity® open source audio editing software provided simultaneous visualisation of sound amplitude. Participants counted cough sounds and cough epochs (clusters containing cough sounds separated by <2s). Results Intraclass correlation coefficients for agreement between individuals on the first, second and third counts of coughs sounds were 0.90 (95% confidence interval 0.67-1.00), 0.86 (CI 0.53-1.00) and 0.92 (CI 0.71-1.00) respectively. For cough epochs these values were 0.84 (0.53-1.00), 0.78 (0.36-0.99) and 0.94 (0.78-1.00) (Figure). Mean counts of both cough sounds and epochs were lower when using the software display. Conclusion Visual representations of audio sequences increase the consistency of cough counting. There is a tendency to discount potential coughs when using visual information.