

FUZZY SAMPLE ENTROPY DETECTS POST-SEDATION IMPAIRMENT OF POSTURAL STEADINESS

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Introduction: Anesthetics impair postural steadiness leading to increased risk of falls. The residual effects of these drugs restrict outpatient throughput due to safe discharge considerations. A practical method to predict the fitness for ambulation and hence a safe discharge time could decrease the risk of postprocedure falls.

Methods: 103 patients (42 males, 61 females, 23-83 years, 150-193 cm, 51-135 kg) stood quietly on a Nintendo® Wii Fit balance board for 60 s before and 60 s after colonoscopy or endoscopy. The patients were sedated with Midazolam (21-132 µg/kg) and Fentanyl (0-3.3 µg/kg). Fuzzy Sample Entropy (FSE)1 was used to quantify the regularity of the sway signal. The separation between the ‘before’ and ‘after’ conditions was determined using the area under the receiver operating characteristic curve (AUC) and a Wilcoxon signed rank test.

Results: FSE decreased in 92/103 patients, from 0.22 ± 0.04 to 0.16 ± 0.04 (AUC=0.85, $p<0.001$).

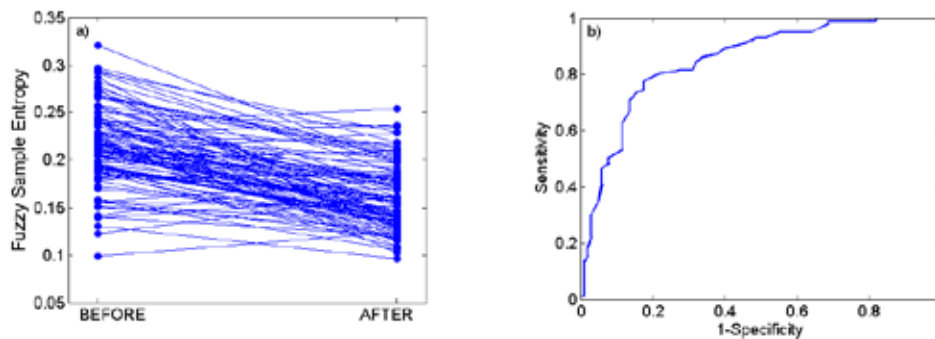


Figure 1: a) Fuzzy Sample Entropy before and after the sedation.
b) Receiver operating characteristic curve with AUC=0.85.

Discussion: FSE detects the impairment of postural steadiness in most patients, and could therefore be used to test their fitness for ambulation. More powerful sway measures could help further separate the ‘before’ and ‘after’ conditions by providing larger AUC.

References:

1. Xiong GL et al. Appl Phys Eng 2010;11:270-79.