# Acute Deep Pain Detection utilizing Heart Rhythm Analysis

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# Introduction

- The aim of anesthesia is to minimize pain experienced by the patient during surgery.

- Our aim was to detect pain in 2 stages of surgery – intubation and the first abdominal cut using HR analysis.

# Methods

- 25 healthy surgical patients underwent anesthesia for laparoscopy in different indications.

- ECG monitoring from the intubation time to the first abdominal cut was analyzed using the Wavelet, the Fourier transformations and the Orthogonal Matching Pursuit.

# Methods

- This is a prospective study in which we recruited patients ‘as we go’.

- Inclusion & exclusion criteria:

| Inclusion criteria | Exclusion criteria |
| --- | --- |
| • Ages 18-75<br>• Competent to give consent<br>• Sinus rhythm on ECG<br>• Absence of any chronic neurological or cardiovascular diseases | • Autonomous instability due to chronic illness (e.g. chronic neurological or cardiovascular disease, diabetic autonomic neuropathy)<br>• Current use of medications that affect HR (e.g. beta blockers) |

# Methods

- The exposure variables were the intubation and the first abdominal cut.
- The outcome variable was the detection of pain (using our ECG analysis methods).
- Calculation of sample size – was not done for this study. The aim was to recruit as many patients as possible, as some data will be made irrelevant due to noise.
- We planned on 25 patients as there are variables which may render patients' participation:
  1. medical conditions
  2. no consent
  3. sampling noise as the procedures under investigation have motion (intubation) and surface interference (first cut – patient cleaning).

# Methods

- We managed to collect clean data from 17 patient for adequate analysis
- 8 patients were excluded due to noise which did not allow proper analysis