

COLLECTION OF VITAL SIGNS DATA FOR ANESTHESIA MONITORING RESEARCH

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Introduction

Patient vital signs data are often used in research, such as designing novel anesthesia monitoring displays [1], improving alarm algorithms [2], and developing decision support algorithms [3]. Researchers have access to vital signs data from either clinical databases or patient simulation software. Databases such as PhysioBank [4], MIMIC [5], and IMPROVE [6] provide vital signs data recorded from patients in Intensive Care Units, but data from patients undergoing anesthesia are seldom available. Patient simulators, such as the Advanced Simulation Corporation Body Simulation or METI Human Patient Simulator, provide realistic representations of vital signs during steady states, but they are less realistic during transitional phases and do not simulate artifacts such as noise, sensor disconnections, and interference [7]. The aim of the present study was to create a repository of vital signs data from patients undergoing a range of anesthetics.

Methods

A laptop running custom software was used to collect monitoring data from four ORs at the Royal Adelaide Hospital. The software interfaced with Philips IntelliVue MP70 monitors, MP30 monitors, and Datex-Ohmeda Aestiva/5 ventilators to collect numerical, waveform and alarm data. Modules used on the MP70 monitor included anesthetic gases, Y-piece spirometry, and BIS. Monitoring data was saved in four formats: (1) all parameters recorded in 10 millisecond intervals as CSV text files, (2) numerical parameters and alarms recorded in 1 second intervals as CSV text files, (3) graphical plots of waveforms such as ECG, and (4) graphical plots of numerics such as HR across the entire case.

Results

Monitoring data was recorded from 32 cases ranging in duration from 13 minutes to 5 hours (median 105 minutes). The 32 cases included 25 general anesthetics (20 with an ETT, 5 with an LMA), 3 spinal anesthetics, and 4 sedation cases. Most cases included ECG, pulse oximetry, capnography, non-invasive blood pressures and airway monitoring data. Y-piece spirometry data was available in 3 cases, BIS in 5 cases, and arterial blood pressure in 4 cases.

Discussion

The present repository's accessible CSV file format provides researchers with non-technical backgrounds (such as clinicians or human factors experts) access to vital signs data for a range of situations that frequently occur during normal anesthesia. Data collected in the present study can be used in human factors research such as the prototyping of novel anesthesia displays. Future work includes collecting data from a larger variety of cases, "playing back" the vital signs data into simulators and clinical monitors, and developing tools for searching and navigating the database.

References

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