

A knowledge-based weaning application in the intensive care unit

*Ch. Schuh*¹⁾, *T. Ehrngruber*²⁾, *M. Hiesmayr*³⁾, *E. Katz*⁴⁾, *K-P. Adlassnig*¹⁾

¹⁾ Department of Medical Computer Sciences, University of Vienna Medical School,
Spitalgasse 23, A-1090 Vienna

²⁾ Department of Mathematics, Fuzzy Logic Laboratorium Linz,
Johannes Kepler University of Linz, A-4040 Linz

³⁾ Department of Cardiothoracic Anaesthesia and Intensive Care Medicine,
University of Vienna Medical School,

Währinger Gürtel 18-20, A-1090 Vienna

⁴⁾ Pulmological Center, Sanatoriumstr. 2, A-1140 Vienna

Introduction: Weaning of patients from mechanical ventilation is a time-consuming process and requires expertise obtained by long clinical practice. This real-time open-loop application is based on controlled rules representing the knowledge and expertise of intensivists. The system is in an experimental stage being able to work with two separate knowledge bases in order to compare two different methodological approaches. One knowledge base is based on crisp if/then condition/action rules, the other is based on a fuzzy control concept.

Methods: Both knowledge bases are designed for ventilator management with BIPAP (Bilevel Intermittent Positive Airway Pressure) mode. The ventilator settings and physiological measurements are taken from the PICIS patient data management system (PDMS) continuously as input. At present the ventilator setting is not controlled directly. The system operates by displaying suggested changes to the intensivist, who then decides whether to execute the recommended changes or not. All active changes may also be entered into the system to provide a complete protocol of the weaning process.

Results: The integrated system is based on Delphi[®], running on a WindowsNT[®] platform, stores all data in a database and is used for post-operative cardiac patients in an intensive care unit (ICU) at the Vienna General Hospital. The application is in a prototype stage and is currently being tested with both knowledge bases. The system is fully designed and is a model for weaning post-operative patients, because expert knowledge about the problem has been utilized

Conclusion: At present, optimizing the knowledge-bases is currently the primary goal. The ultimate aim is to grasp the trends in the field of weaning in order to design a closed loop system.