Getting the Most from Clinical Data through Physiological Modelling and Medical Decision Support

Bram W. Smith, Stephen E. Rees, Toke F. Christensen, Dan S. Karbing, Steen Andreassen
Centre for Model-based Medical Decision Support (MMDS), Aalborg University, Denmark

Introduction

Despite the widespread use of clinical databases that enable automated storage and retrieval of patient measurements, their implementation in supporting clinical decisions is somewhat limited. Clinicians are still faced with the difficult task of interpreting large amounts of patient data to diagnose illness and monitor recovery. This abstract presents an architecture that combines standard database technology with physiological modelling to create a clinical decision support system. The system can automatically retrieve data, interpret it using a variety of methods and assist in diagnosis and treatment.

Method

Figure 1 illustrates the architecture which is implemented, in this case, for assisting treatment of ventilated patients. The architecture includes a central database allowing data communication with three basic types of clients for data input, interpretation and decision support. The input clients enter raw data from either the clinician or by connecting directly to medical equipment such as a ventilators, gas analysers and clinical monitors. The interpretation clients, which range from simple body surface area calculations to complex physiological models of the lungs [1], are notified when new data is available in the database. This data is used by the interpretation clients to calculate more abstract values such as metabolic parameters, lung function and blood properties, which are also added to the database. Finally, the decision support clients can load both the raw and calculated data, and display it in a way that best helps clinicians diagnose the patient state and choose the most suitable ventilator settings [2].

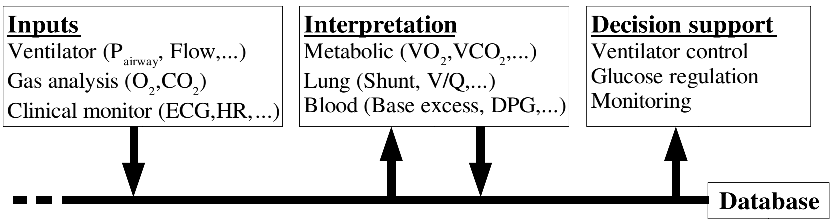

Figure 1, Illustration of the 3 basic types of clients that connect to the database.

Results

The presented modular design makes software development easier by allowing independent development of device drivers, calculation methods, physiological models and decision support systems to extend the functionality of the architecture. Implementation in the clinical environment assists clinicians by both adding a level of abstraction to raw data, to give a deeper understanding of patient condition, and offering assistance in selecting the most suitable treatment strategy.

Conclusion

This abstract presents a modular architecture combining existing database technology with physiological modelling and decision support for assisting the clinician in diagnosing and treating the patient. In doing so we illustrate the potential for building systems which not only store data, but aid in the clinical decision making process.

References

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