Electronic patient monitoring data archive derived from Philips Intelivue System via HL7 protocol

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Introduction

Philips patient monitoring systems are commonly accepted in ICU medical circles. The typical configuration of Philips IntelliVue system includes several bedside patient monitors and information centre organized together in a closed Philips LAN. VueLink extension provides interface means for integration monitoring data from other vendor's devices into a inform data monitoring stream. In spite of generally powerful and flexible features of Phylips IntelliVue the system has some limitations. The Information centre in a standard modification is unable to keep the monitoring history longer than for several days. Moreover the Information centre software does not provide necessary features for adequate and user friendly displaying the monitoring trends.

Goal

The goal of this work was to create a database for storing historical ICU patient monitoring data derived from Philips IntelliVue System using HL7 standard 1 for medical software communication and workout client software for visualization and measuring the moni- toring data.

System architecture

The architecture of the system is presented in Fig. 1. Patient monitors PM60 together with VueLink modules, Maquet ventilators, B Braun infusion pumps, ICP monitors and other monitoring equipment form the pool of source monitoring data (about 180 parameters, events and alarm messages). Each monitor is connected to the Information Centre via Philips Ethernet network. The HL7 option is installed and activated in the Information Centre and the monitoring data is sent to the external hospital LAN. Special software parser analyzes the HL7 messages and the monitoring data is stored in the monitoring data- base. It is possible to change the time interval of sampling: by default it is set to 5 s. The database engine has a link to Hospital Information System (HIS) via another HL7 software driver and it is possible to access the monitoring database directly from HIS.

Client software

Special software was developed to provide graphical interface to the monitoring database for visualization and measurement the monitor- ing data. The program allows data scrolling back and forward in time, display values against time marker, change time scale. The trend graphs and values can be organized in groups, up to 8 graphs can be simultaneously shown. Colors and appearance schemes and user preferences are stored in user profile. The software also provides required data protection features.

Patients with severe brain injury often need monitoring of intra-

cranial pressure (ICP). It is known that the ICP rise is very much dangerous and adequate therapy and even surgery must be carried out in time. For express estimation of brain autoregulation state so called Pressure Reactivity Index (PRx) 2 is used. Patient 9 15, years with heavy combined head injury.

The effect of medicament therapy against the rise of ICP is shown in Fig. 2. PRx changes from positive to negative values which dem- onstrates the restoration of cerebral autoregulation on the background and ICP decrease.

Conclusion

The developed monitoring data archive system provides reach and flexible means for storing, visualization and measurement of patient monitoring data. The monitoring database and client software are
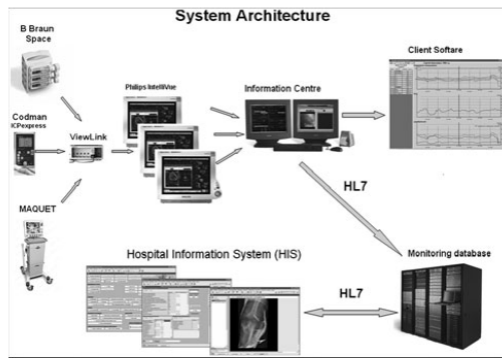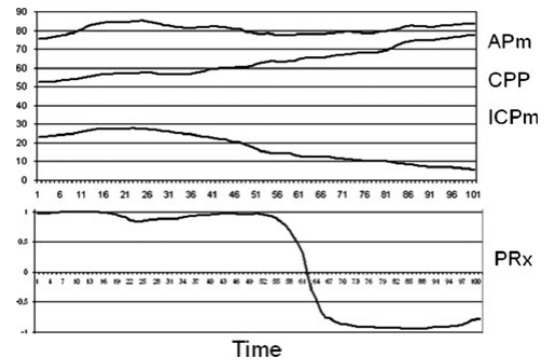
Fig. 1

Fig. 2

integrated into HIS using of HL7 standard. This work is a first step to creation an integrated multimedia ICU record.

References

1.   HL7 Patient Data Interface Programmer's Guide. Copyright 2003 Philips Electronics North America Corporation
2.   Cerebrovascular reactivity during hypothermia and rewarming. A. Lavinio and et al. British Journal of Anaesthesia 99(2): 237–44 (2007).